

IN THE
UNITED STATES COURT OF APPEALS

)	
)	
)	No. 22592-A
EO. J. MEYER MANUFACTURING)	
O,)	
)	
Appellant,)	
vs.)	
)	
AN MARINO ELECTRONIC)	
CORPORATION)	
)	
Appellee.)	
)	

Appeal from the United States District Court
for the Central District of California

APPELLANT'S BRIEF

SMYTH, ROSTON & PAVITT
ELLSWORTH R. ROSTON
WILLIAM H. PAVITT, JR.
and CHARLES H. SCHWARTZ

4262 Wilshire Boulevard
Los Angeles, California 90005

Attorneys for Appellant

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WM. B. LUCK, CLERK



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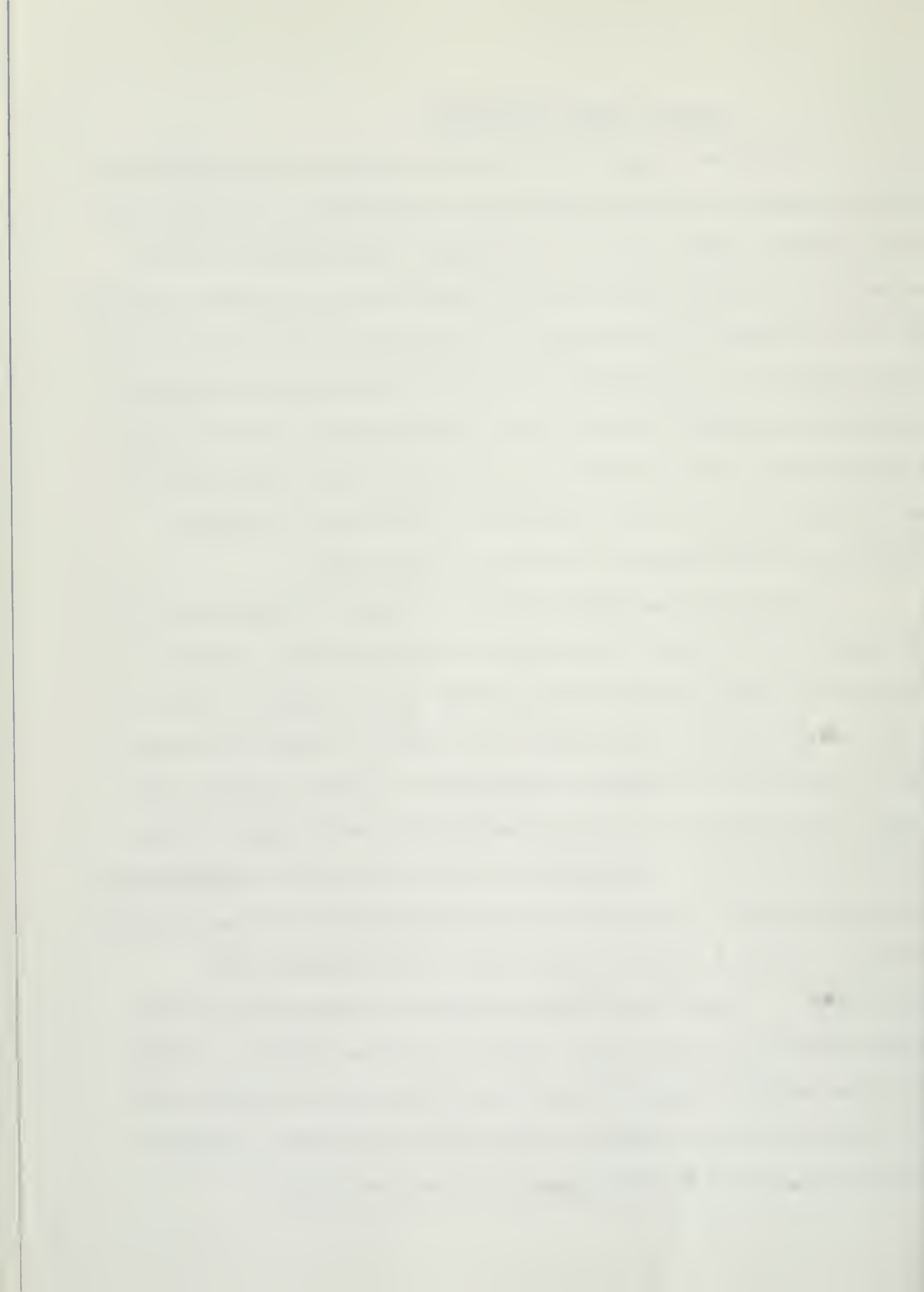
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A. JURISDICTIONAL STATEMENT

Defendant appeals from those portions of the Order and Judgment entered in Civil Action No. 64-1421-WPG on October 10, 1967, holding Claims 7 to 15, inclusive, and Claims 17 to 24, inclusive, of United States Letters Patent No. 3,133,640 invalid, and not infringed by the making and selling by plaintiff of its Models SME 303 and SLIMLIGHT machines; dismissing defendant's counterclaim against plaintiff for infringement of said claims of said patent; and awarding plaintiff its costs incurred in that portion of the trial relating to the issues of patent validity and infringement, as taxed by the Clerk.

The Second Amended Complaint alleged jurisdiction of the District Court over the second claim for relief therein; pleaded under §§ 1338 and 2201 and 2202 of the Judicial Code of the United States (Title 28, U.S. Code), in that the action was for declaratory judgment with respect to the validity and alleged infringement and non-enforceability of a United States patent (R. 105-111). Defendant's counterclaim for infringement of said patent No. 3,133,640 averred jurisdiction of the District Court also under § 1338 of Title 28 of the Judicial Code (R. 154-158). There was further pleaded by plaintiff in the Second Amended Complaint, as a first claim for relief, a claim under the antitrust laws of the United States (R. 94-104), and as a third claim for relief, a claim for declaratory judgment of invalidity and non-infringement of another patent



(No. 3,081,666)(R. 112-116). The latter claim for relief was subsequently dismissed by stipulation of the parties (R. 810); and the antitrust claim was severed by Pre-Trial Order No. 1 and deferred both for discovery and trial until after the trial of the second claim for relief involving patent No. 3,133,640 (R. 836-837).

The issue as to whether defendant had misused patent No. 3,133,640 was tried first during September 27, 28, 29 and 30, and resulted in a ruling in favor of defendant (Tr. *725-741). Appropriate findings of fact and conclusions of law were signed by the Court on January 24, 1967 (R. 1813-1837). The issues of patent validity and infringement of patent No. 3,133,640 were tried commencing January 3, 1967 and concluding January 31, 1967 (Tr. 1-2515). On April 7, 1967, the District Court filed a memorandum of its tentative conclusions (R. 1847-1851) and then heard further argument of counsel on April 17, 1967, with respect to such tentative conclusions (Tr. 2516-2614). On June 9, 1967, the Court filed a further memorandum of its conclusions respecting the issues of validity and infringement (R. 1862-1867), and heard further argument of counsel with respect to such conclusions on June 16, 1967, thereupon indicating its final conclusions orally from the Bench (Tr. 2683-2706). Findings of Fact, Conclusions of Law and Order and Judgment (the latter referencing the Findings of Fact and Conclusions of Law on the misuse issue signed January 24, 1967) were entered October 10, 1967 (R. 1938-1958).

* The page references are to the patent portion of the trial; however, the page references with an asterisk are to the misuse portion of the trial.

Although the District Court in its October 10, 1967, order and judgment did not thus adjudicate the antitrust claim for relief pleaded in the Second Amended Complaint, the Court expressly determined, pursuant to Rule 54(b) of the Federal Rules of Civil Procedure, that there was no just reason for delay and expressly directed that final judgment be entered upon all severed claims theretofore tried by the Court (R. 1959-1962). Jurisdiction of this Court of Appeals over the present appeal is, therefore, predicated upon Section 1291 of the Judicial Code.

Defendant's notice of appeal was filed November 6, 1967 (R. 1963-1964).

B. STATEMENT OF THE CASE

1. The Present Action

Plaintiff commenced the present action for declaratory judgment of patent invalidity, non-infringement and patent misuse and alleged antitrust violation in the Fall of 1965 shortly after plaintiff had been charged by defendant with infringement of the patent-in-suit (Pltf. Exh. 10). Defendant counterclaimed for patent infringement. Defendant is the assignee of that patent pursuant to the terms of an Agreement dated September 21, 1959 (Pltf. Exh. 9).

2. The Invention of the Patent-in-Suit

(a) The need in the Bottling Industry for, and purpose of, the Invention of the Patent-in-Suit

The invention of the patent-in-suit is entitled in the patent as "BOTTLE INSPECTION SYSTEM". The purpose of this

"System" is to detect dirt particles or foreign objects in empty bottles after the bottles have been washed in a bottling plant and are moving rapidly toward a station where they are to be filled and later capped.

By 1957, with the automation of other types of bottle handling equipment, including washing machines, conveyors, fillers, cappers etc., bottles were being moved in their processing lines at from 100 to 600 per minute (Tr. 127). Such automation, however, presented a serious problem in the necessity for properly inspecting the washed bottles prior to filling (Tr. 127, 907-908). Although certain machines had been on the market, they were not widely employed, nor were they highly thought of by such large bottlers as the Coca Cola Company (Tr. 908). The generally accepted way of accomplishing the inspection of empty bottles was by human visual inspection (Tr. 127, 907-908). But even when the inspection was divided between two persons, it was difficult for human beings visually to check bottles passing along a line at 600 per minute (10 bottles a second)(Tr. 907-908). Such visual inspection could hardly be expected to catch bottles with relatively small particles, as for example particles as small as one-eighth of an inch in diameter (Tr. 127).

The only machines for inspecting empty bottles on the market in 1957 were the Mayer Twin-Beam machine and another machine known as the "Photoelim" (Tr.*172-173; *251-252; 618-622; Exh. 1-2). Both of these machines were direct current (DC)

machines the operation and limitations of which will be discussed infra pages 16-19.

There was also a full bottle inspection machine offered by the Radio Corporation of America, but this full bottle inspection machine spun the full bottle so as to circulate its contents (Tr. 613), an operation which could not physically be performed at rates even approaching 10 bottles a second without shattering the bottles. Further disadvantages were that the bottle was inspected only after having been filled and that particles stuck to the bottom of the bottles would not be detected (Tr. 615) and floating objects would not be detected.

Thus, in 1957 there existed an unfilled need, in the vast bottling industry in this country, for a device which could rapidly and effectively inspect bottles moving at a high rate of speed along a conveyor line after washing and before filling of the bottles.

In his Findings of Fact, the District Court stated:

"The need for a satisfactory machine for inspecting empty bottles for foreign particles existed for a considerable period of time before the invention of the embodiment of the '640 patent." (Finding No. 12(b); R. 1943).

(b) The Machines in Use Today

When the patent portion of this action was tried in January 1967, there were three types of bottle inspection machines

on the market and widely used in the bottling industry in the United States (Tr. *118). These three machines were:

(1) The Meyer Mark IV machine which originated with the three joint inventors of the patent-in-suit (Tr. 263-269, 2352, *181). The Meyer Mark IV machine incorporates the features of the patent-in-suit (Tr. 472-480).

(2) The Barry-Wehmiller machine, which was devised by James H. Wyman, one of the three inventors of the patent-in-suit, after he terminated his association with the company founded by the three inventors (Tr. *169). The Barry-Wehmiller machine employed the same concepts as the '640 patent (Tr. 624-630); and

(3) The San Marino machine which is charged to infringe and was devised by Robert Husome -- who had worked for Wyman when the latter was perfecting the Barry-Wehmiller machine -- after Husome terminated his association with Wyman (Tr. *114-117, *137).

These three types of machines have almost completely supplanted all other empty bottle inspection machines which have ever been marketed in this country (Tr. *118, 903-910).

In this connection the District Court found as follows in Findings 12(c) and 12(d):

"The invention of the '640 patent has enjoyed considerable commercial success.

A bottle designated as 10 is shown at a particular instant when it is essentially centered in the inspection zone (Tr. 296). A light source or lamp 20 is disposed below and centered with respect to the bottle (Tr. 296). An opal glass diffuser 22 is disposed directly beneath the bottle and between the bottle and the light source (Tr. 296). Directly above the bottle is a lens 28 which is used primarily to focus the image of the bottom of the bottle on a reticle 30; and directly above the reticle 30 is a photocell 24 (Tr. 296). The reticle is a disc which, in the Figure 2 embodiment, is constructed with a series of alternate opaque and translucent pie-shaped areas. In the embodiment shown in Figure 1, both the reticle and the lens are mounted within a cylinder which is rotated by a motor 36 and pulley 38 (Tr. 296).

A physical embodiment of the thus illustrated mechanical set-up of the patent was introduced in the form of Plaintiff's Exhibit AA (Tr. 298). Exhibit AA differs in that the lens is not spun with the reticle, but this does not affect the optical qualities of the lens or affect the operation of the system (Tr. 297).

In Figure 1 of the '640 patent-in-suit, the light source (including the opal glass), the center of rotation of the reticle and center of the photocell are all located on a common axis (Tr. 300). Because of this, the optical system in the '640 patent may be considered as a "centered optical system".

The system is triggered by an electronic process for inspection when the bottle becomes disposed in the correct position to initiate its examination (Col. 2, lines 64-71 of Exh. 10 and Tr. 300). This correct position of the bottle occurs when the center of the bottle has been conveyed to a position a relatively short distance, such as approximately one-sixteenth inch, in front of the center line extending through the centers of the light source 20, the lens 28 and the reticle 30 (Tr. 300-301). The examination of the bottle continues through the period of time during which the center of the bottle is being conveyed to a relatively short distance, such as approximately one-sixteenth inch, beyond the center line extending through the centers of the light source 22, the lens 28 and the reticle 30 (Tr. 300). It is one of the features of this type of scanning device that the bottle does not have to be exactly centered at all times, since the scanning device does not introduce an extraneous signal if the bottle is slightly off-center (Tr. 301). The number of revolutions the reticle makes during the movement of the bottle through the inspection zone depends upon the speed at which the bottles are moved along the line; the reticle should make at least one complete revolution while the bottle is in the inspection zone, so the system is designed to provide for at least one revolution of the disc on the high speed lines, e.g. 600-700 per minute; but on a slow line, during the same period of movement, it may scan four or five times (Tr. 301-302).



When the bottle is clean, the spinning of the reticle produces no change in the total amount of light which passes to the photocell through the bottle and reticle (Tr. 280-286, 411-417 and Exh. Z). However, should a foreign particle appear in the bottle, the covering and uncovering of the particle by each opaque segment of the reticle will result in the production of variations in the amount of light reaching the photocell at progressive instants of time (Tr. 157-171, 292-294). These variations result because the total amount of light passing through the reticle to the photocell remains a maximum when the particle is so disposed that it does not block the passage of any light through the translucent segments of the reticle (Tr. 157-171). However, the amount of light passing through the translucent segments decreases from this maximum when the reticle rotates to a position where the particle blocks the passage of light through the translucent segments of the reticle (Tr. 157-171).

The variations in the amount of light reaching the photocell cause the photocell to produce an alternating current electrical signal or pulse with characteristics corresponding to the characteristics of the light variations (Tr. 157-191). Alternating current (AC) may be defined as a flow of electricity which reaches a maximum in one direction, decreases to zero, then reverses itself and reaches maximum in the opposite direction, with the cycle repeated continuously (Tr. 133). However, there are many forms of AC; when people speak of AC, they usually

refer to waveforms that fluctuate as a function of time (Tr. 136) to distinguish the steady state (or dc) signal. The number of cycles of fluctuation per second is called the frequency (Tr. 133). AC is a term that is used rather loosely in the electronics industry (Tr. 135). Among the AC waveforms are square or rectangular waves, sine waves and pulse trains (Tr. 137, 147; Pltf. Exh. E). An alternating current pulse is an alternating current wave of brief duration (Tr. 138-140). A pulse is a particular form of alternating signal and is usually differentiated from a continuous alternating signal in not occurring as often or repetitively (Tr. 139). A pulse is made up of alternating currents (Tr. 152) of different frequencies and can be synthesized from AC components or alternating sine waves (Tr. 152) of different frequencies. It is a special form of alternating current (Tr. 180).

The alternating current signal or pulse produced by the photocell has a fundamental frequency determined by the speed of rotation of the reticle times the number of opaque segments (or spokes) in the reticle (Tr. 2383-2384). However, the alternating current signal or pulse also has other frequencies dependent upon the characteristics of the particle (Tr. 190-198). These other frequencies are integral multiples of the fundamental frequency (Tr. 190-198).

The system of the '640 patent essentially picks up the alternating current signal or pulse produced by the reticle

passing over the image of the particle, which signal or pulse may be quite small in amplitude or intensity. The system then amplifies that signal by electronic techniques while simultaneously attenuating what would otherwise be interfering alternating current signals or pulses of different frequency characteristics (and of much greater initial amplitude than the particle-indicating signal or pulse) (Tr. 221-225, 306). These interfering signals or pulses may be produced by the edge of the bottle, stippling and lettering in the bottle bottom and other causes not related to the presence of the foreign particle in the bottle. Some of the interfering signals, and particularly the signals representing edge effects, have magnitudes considerably in excess of the magnitudes of the signals produced by the particles in the bottoms of the bottles so as to mask or obscure the signals produced by the particles at the bottom of the bottle (Tr. 199-207, 498-499, 2375-2379). The edge effects produce signal components with frequencies below those produced by the particles in the bottom of the bottle (Tr. 2375-2379), and the signal components representing stippling and lettering at the bottom of the bottle have frequencies above those produced by the particles in the bottom of the bottle (Tr. 1170-1171, 1885-1887). The operation of the reticle to produce, during rotation of the reticle, signals having different frequencies representative of particles in the bottom of the bottle, edge and other effects in the bottle and stippling and lettering at



the bottom of the bottle is known as "spatial filtering" (Tr. 2375-2379).

In addition to utilizing the thus-produced alternating current or pulsed signals, the patented system also responds to changes in the direct current output of the photocell in the following manner:

The overall intensity of the light passing through the bottle to the photocell is dependent upon the translucent characteristics of the bottle (Tr. 289-295). Thus, a clean transparent bottle passes the maximum amount of light through the spanning reticle to the photocell so that the photocell produces its highest direct current (DC) signal (Tr. 289-295). With relatively opaque bottles or generally dirty bottles, the intensity of the light reaching the photocell decreases so that a direct current signal of decreased amplitude appears at the output of the photocell (Tr. 289-295). Similarly, when a large particle such as a cigar butt covers a substantial portion of the bottom of the bottle, the intensity of the light reaching the photocell (and its DC output voltage) decreases substantially (Tr. 199-207). The overall intensity of the light reaching the photocell (and DC output voltage) remains substantially constant at one level during each revolution of the reticle for a bottle of a particular opacity or at a second level for a generally dirty bottle or at a third level for a bottle with a large

particle in it. In this way, the substantially constant light intensity for each individual bottle can be measured to determine whether the bottle is opaque or has large particles in the bottom of the bottle.

Electronic circuitry is provided in the '640 system for separating the alternating current signals from the direct current signals and for individually processing the alternating current signals and the direct current signals (Tr. 304-314). For example, the alternating current signals and the direct current signals from the photocell 24 are amplified by the amplifier 46 (Tr. 304). The direct current signals trigger a bottle rejection mechanism when the direct current signal is less than a particular value, thus indicating that the bottle being inspected is undesirably opaque or that there is a large particle in the bottom of the bottle (Tr. 308).

The alternating currents produced by the photocell 46 are passed through the amplifier 50 only during the inspection period described above (Tr. 304-314). This amplifier 50 operates as an electronic filter to pass only the signals at the frequencies representing the particles and attenuate the signals at all other frequencies (Tr. 306). In other words, the amplifier 50 discriminates the signals representing the particles from the signals representing undesirable effects which cloud the effects of the particles. If the signals at the frequencies representing the particles have an amplitude



greater than a particular value, the signals are detected by the circuit 52 so as to trigger a bottle rejection mechanism 56 (Tr. 307-308). This enables the plunger 58 to push the bottle from the conveyor into a reject slide.

The use of a centered optical system to provide spatial filtering and the use of electronic circuitry to provide electronic filtering constitute the basic concept of the '640 patent. By providing such a combination of features, the '640 patent constitutes the first system for detecting small particles in bottles while scanning the entire bottom of the bottle.

3. How the Invention of the Patent-in-Suit was made

For several years prior to 1958, Fredrick L. Calhoun, James Wyman and Donald Williams had been working in the Systems Analysis Department of the Guided Missile Division of Hughes Aircraft Company (Tr. 99,*171) where they had become acquainted with each other (Tr. 99). Each of them had his own "home" type project and some equipment (Tr.*171). In 1957 they decided to pool their resources, form a legal entity and buy some equipment with which to experiment (Tr.*171). The legal entity so formed was a corporation by the name of Industrial Dynamics Corp. (Tr.*171).

In 1955 Wyman had been at Western Research doing some work with a group for the dairy industry (Tr.*172). One of the members was president of Adohr Milk Farms and he had told

Wyman about problems with foreign objects in milk bottles (Tr.*172). However, Wyman did nothing further about bottle inspection until it was discussed again by his friend in 1957. After this discussion, work was begun by Wyman and Calhoun on a machine to look for foreign objects in milk bottles (Tr.*172).

According to Calhoun, Wyman asked Calhoun if he could design and make a device that would detect foreign ingredients in bottles (Tr. 99). Shortly after Wyman and Calhoun began this project, Williams was asked to join in the venture and did so (Tr. 99-100).

Calhoun, Williams and Wyman first had an inexpensive patent search conducted in the Fall of 1957 by the patent firm of Smyth & Roston, and acquired and studied a group of 30 or 40 patents on bottle inspectors (Tr.*173; 235-236). Work was commenced to ascertain whether a device could be constructed which would be able to detect something the size of a nickle or penny in the bottle (Tr. 100). At that time Wyman and Calhoun were aware of the fact that the Mayer Twin-Beam machine (Tr.*172-173;*251) was on the market. Calhoun had also received literature on the "Photoelim" empty bottle inspector (Tr.*251-252).

The first means devised by the three associates to inspect an empty bottle were very crude (Tr. 100-101). This crude means comprised what is commonly referred to as a DC system, or average light system (Tr. 101). The three associates attempted to measure by photoelectric techniques the average

light that passed through a bottle when a light source was placed underneath that bottle, and to see if this average light varied from bottle to bottle (Tr. 101). As Calhoun described it: They used a lamp underneath the bottle and an opal glass to diffuse the light so that the light would be uniform close to the bottle; the light passed up through the neck of the bottle, and above the bottle they located a photocell to receive the light (Tr. 112-113; Plft. Exh. H). The photocell converted the received light into an electrical signal having characteristics representative of the light (Tr. 113). As the intensity of the light changed, so did the signal on the photocell (Tr. 113). The photocell was connected to a DC amplifier and the latter was monitored (Tr. 113-114). If an object large enough to block a substantial portion of the light was placed in the bottle, a reduced intensity of light reached the photocell and the DC value changed (Tr. 114) sufficiently to cause the bottle to be rejected.

The difficulty with such a system is that one could sample only the average light passing through the bottle and measure its absolute value (Tr. 115). Hence if the variations in the light passage due to a change in the color of the bottle was as great as, or greater than, the variation in light passage caused by the presence of a particle in the bottle, the DC system would not detect the particle (Tr. 115-118). This observation was confirmed by tests run in the Industrial Dynamics Corporation plant (Tr. 118).

The three associates engaged in various attempts to perfect this DC system. For example, they divided the bottom of the bottle into discrete sectors, each with its own photocell; they also inserted the photocell into the bottle; and they used different light sources to increase the sensitivity of the system (Tr. 119-120). These efforts consumed three or four months (Tr. 120). However, they were never able to obtain a DC system that would reliably detect small objects in a bottle (Tr. 120).

Through Wyman's friendship with the owner of Adohr Dairy Farms in Los Angeles, the first unit which the three joint inventors made was tested in the Adohr Dairy (Tr. 124). After exhaustive tests had been conducted on the DC method, Wyman, Williams and Calhoun had a long meeting to discuss six or seven other possible inspection techniques that could be used, all of which were alternating current (or AC) techniques (Tr. 132).

Once they found that the DC type system would not be useful for empty bottle inspection, Calhoun, Williams and Wyman considered various types of scanning techniques (Tr. 232) to be used with an AC system. As Dr. Greist testified, the number of different scanning systems that could be used was countless (Tr. 2307). At that time there were many systems that had been used and were being used in fields other than bottle inspection systems, and the three associates examined each one to try to determine which would be best suited for empty bottle inspection (Tr. 232). Among the scanning techniques so considered were the following:

- a. Raster Scan - This is the type of scan which

occurs in television sets where the scanning is accomplished by an electronic beam moved in a series of parallel straight horizontal lines each disposed slightly below the previous one (Tr. 232-235; Exhs. Q and S). The difficulty with using this type of scan is not obvious at first; but, when one superimposes the raster scan over a round bottle, the scanner cannot differentiate between darkness caused by a particle and that caused by the scanner passing over the edge of the bottle (Tr. 234-235). Further, this type of scanning has no ability to produce any particular type of pulses to enable one to obtain frequency discrimination between the signals produced by the particles and the signals produced by the edge of the bottle and lettering at the bottom of the bottle (Tr. 235). Hence this type of system was discarded (Tr. 235). A raster type of scan was disclosed in some of the patents which the three joint inventors received in the patent search conducted in the Fall of 1957, including at least one patent issued to Mr. Stoate (Tr. 236), one of plaintiff's principal witnesses.

b. Spiral Scan - This system is used in many applications, particularly in radar and other applications where one applies the signal to a round-type screen. Passage of a small light spot is started on one edge of a disc and is moved in a circular pattern and inwardly to produce a spiral pattern; or conversely, the scan may be started at the center and spiralled outwardly (Tr. 236, Exhs. Q and T). As with a raster scan, this type of scanning does not provide the characteristic of spatial filtering (Tr. 237-244) such that the signal components representing the particle can become separated in frequency from the signal

components representing undesirable effects such as the edge of the bottle and the lettering at the bottom of the bottle. The spiral system was therefore also discarded (Tr. 237). Although Calhoun was not certain that this spiral system was disclosed in any of the patents which he had received in the patent search, he was familiar with it from working with radar and television (Tr. 238-239).

c. Light Chopper - This system employs a reticle similar to that shown in the patent-in-suit, but it is not centered on the field to be inspected and is not practical for application to inspecting empty bottles (Tr. 239, 250, Exhs. Q and U).

After evaluating every scanning system that they could think of, the three inventors came up with the centered optical scanning system (Tr. 240; Exhs. Q and V) which forms a part of the '640 patent. Calhoun admitted that the centered reticle itself is not a new device, having been used in other fields; but he asserted that it was certainly new in the field of empty bottle inspection, particularly the way they used it in combination with their amplifying system (Tr. 241). At the time that Calhoun received the patents in the patent search, he stated he could not construe or could not even put together any centered reticle system out of all the patents he had found; he knew of centered reticle system in other applications (Tr. 253) (e.g. in missile and star tracking at Hughes) but he did not find a patent that suggested the use of such a device for a bottle inspector (Tr. 253).

In working with the centered reticle, the three joint inventors tried a number of different types of reticles (Tr. 262). After the centered reticle system was suggested, it took several months to provide a system that would operate successfully and give any type of indication of a particle in the bottle (Tr. 266). The first centered reticle system made by the joint inventors did not work at all (Tr. 266) in that at first there were a considerable number of extraneous modulations within the scanning system itself - extraneous signals that were very hard to eliminate (Tr. 267). An amplifier system had to be developed that would meet the requirement of discriminating frequencies (Tr. 267). There were problems in the timing of the system to be sure that it inspected the bottle in the correct place at very high speeds and that no transient or unwanted signals were introduced into the system by way of the triggering cycle (Tr. 268).

The first system did not employ a combination of AC and DC (Tr. 269). Initially the three joint inventors separated the AC from the DC so they could work out each circuit, and then later they combined them (Tr. 269). They had to find a way to best combine the AC and the DC components (Tr. 268). Prior patents had not been successful in effecting any such combination since such prior patents related to full bottle inspection techniques which did not work for empty bottle inspection (Tr. 268).

The joint inventors found that a principal problem was to discriminate the signal produced by a particle in the bottle from electrical background noise which could come from a number



of sources, such as fluorescent lamps, signals induced into the amplifier, scan noises, or noise off the bottom of the bottle (Tr. 270). These were usually relatively low frequency signals (Tr. 271). The term "noise" means undesirable signals such as edge effects which are produced at the bottom of the bottle (Tr. 270).

d. Other Techniques and Alternative Devices Considered and Tested by the Inventors - In developing their bottle inspection system to the form disclosed in the '640 patent, the inventors tried reticles having a plurality of alternately disposed, evenly spaced opaque and transparent segments and reticles having a plurality of alternately disposed, unevenly spaced opaque and transparent segments (Tr. 481-486). They also tried reticles having only a single transparent segment (Tr. 481-486) and a single opaque segment.

The inventors also tried optical systems which reflected light to the photocell rather than passing light directly to the photocell (Tr. 487-490). The system worked satisfactorily with the different types of reticles and with the reflective optics (Tr. 481-490). All of these alternatives were tried before the filing of the patent application which matured into the '640 patent (Tr. 481-490).

4. The Prior Art Patents relied upon by the District Court in holding the Patent-in-Suit Invalid

In order to hold that the patent-in-suit was invalid for obviousness under Section 103 of the Patent Codification Act,

the District Court first had to determine that the scope of the field of the art from which prior patents could be taken was much broader than bottle inspection, since the Court specifically found that "...all of the elements in the patent in suit do not have counterparts in the field of bottle inspection (Finding No. 13; R. 1944); and further:

"The '640 patent discloses the first system for detecting small particles in the bottom of a bottle while scanning the bottom of the bottle, including the edge of the bottle, without masking the edge of the bottle." (Finding No. 12(a); R. 1943)

Consequently, the District Court made the following findings of fact:

"9. The nature of the art we are here concerned with is the detection of foreign objects in a field of view by electro-optical techniques, rather than being limited to the bottle inspection field. (This finding also appears as conclusion of law No. 5.)

"10. Electro-optical systems for the detection of objects in the sky, detection of material moving on a conveyor, detection of the presence of objects moving on the ground, and detection of objects in a container, all are systems which reside in an analogous art, and such systems employ similar elements in a similar relationship for a similar purpose. Further, such systems are related by the end object of seeking to detect an object having distinct light or dark characteristics in a

background of different light or dark characteristics." (Findings Nos. 9, 10; R. 1941-1942).

However, even having made the determination that the relevant art includes patents thus broadly outside the field of bottle inspection, the District Court found in paragraph 11(f) -

"(f) No single reference cited by plaintiff discloses a bottle inspection system employing techniques of spatial filtering or the combination of spatial filtering and electronic frequency selection as defined in paragraph 4 of these Findings of Fact." (Finding No. 11(f); R. 1943).

However, the Court then went on to make the Findings which are quoted in Appendix A.

By including the Findings quoted above, the District Court defined the relevant prior art not as that of bottle inspection patents or publications, but rather as patents broadly having to do with the detection of objects in a field of view by electro-optical techniques. Included within the latter are patents on devices and techniques for the tracking of stars and missiles. When the teachings are taken into consideration, the District Court concluded that the invention of the patent-in-suit would have been obvious to a man of average skill in the art so broadly defined. However, the District Court did include the following Conclusion of Law:

"13. If the missile and star tracking field cannot be properly considered with the bottle inspection field as a single art of detecting objects in a field of view by

electro-optical techniques, the system disclosed and claimed in the '640 patent constitutes an invention over the prior art relating to bottle inspection, and the patent is valid." (Conclusion No. 13, R. 1956).

5. How the San Marino Machine was Developed

The San Marino machine was not the product of a development wholly unrelated to the development of the bottle inspector by the three joint inventors of the patent-in-suit (Tr. 624-630, 2352, *169, *181). After the three joint inventors (Calhoun, Wyman and Williams) had determined in the Spring of 1958 that they had attained a system which could be made to work successfully, they filed their original patent application (June 12, 1958) (Exh. 10; Tr. 266-271). About this time they were beginning to make and sell a few models in accordance with the disclosure of their first patent application. A further improvement on the machine was made by Calhoun and one Browning upon which a second patent application was filed on April 22, 1959. This further improvement was made so that the system could detect particles at the center of the bottle to eliminate a dead spot which the original system had and which the San Marino machine still has (Tr. 431-436, 472-477).

Because of a dispute which arose between Wyman and Calhoun concerning the method of marketing the Mark IV units and concerning the management of the Company, Wyman left Industrial Dynamics Corporation in the Summer of 1959 and thereafter formed his own company which he called "Industrial

Automation" (Tr. *167-175). Through his new company, Wyman embarked upon the development of an empty bottle inspection machine designed to compete with the Mark IV (Tr. *167-170). Wyman, of course, knew the principles of construction and operation of the system of the patent-in-suit, particularly since he used as his patent attorney the same one who prepared and filed the patent application which matured into the '640 patent (Tr. *266, Wyman dep. 167-175). Wyman filed a patent application and obtained a patent on his machine (Exh. 4), which included a number of similarities between the machine of the patent-in-suit and the machine disclosed in the Wyman patent (Tr. 624-629).

While Wyman was thus developing his empty bottle inspector, he employed Robert Husome, who later designed the San Marino machine which defendant has charged infringes the patent-in-suit. Mr. Husome thereby not only became intimately familiar with the details of the construction and principles of operation of the Wyman empty bottle inspector (Hus. dep. 5-7), but Wyman discussed with Husome certain features of the Mark IV machine, which, by then, was being made and sold by defendant (Hus. dep. 14-16).

When the Wyman development was completed and sold to Barry-Wehmiller Co., about September 15, 1962, Husome left Industrial Automation and within weeks began to work on the development of the San Marino machine (Tr. *112-114, Hus. dep. 7, 29, 34). The first San Marino machine was developed and manufactured for sale between October, 1962 and February, 1963, a period of only

a few months after Husome left the employ of Industrial Automation (Hus. dep. 29, 34).

6. The Construction and Operation of the San Marino Machine

(a) The San Marino Optical System

This system is revealed in two of plaintiff's drawings (Exhs. AC and AD), as supplemented by explanatory testimony. Exhibits AC and AD are included as Appendix B. Referring to Exhibit AC, light from a source is directed upwardly through an opal glass and the bottom of the bottle to a rotating disc having a single narrow light reflecting line (or mirror surface) extending from the center of the disc radially outwardly to the disc edge (Tr. 361-367). The disc (with its mirrored line) is centered with respect to the field of view (Tr. 361-367). The mirrored line is disposed so that the image of any particle at the bottom of the bottle is focused on the line at some position during the rotation of the disc. The light directed to the line is reflected by the mirror surface to a photocell disposed below and to one side of the mirror (Tr. 361-367). In other words, plaintiff has provided a centered optical system.

In this way, the photocell in plaintiff's machine produces a voltage output having a direct relationship to the intensity of the light reflected to it by the mirrored line (Tr. 369-391, 586-596). The intensity of the reflected light thus depends upon the opacity of the bottle or the occurrence of large particles in the bottle (Tr. 369-391, 586-596). Moreover,

the photocell output will have signal variations indicating the presence of small particles, bottle edges and other objects in or associated with the bottom of the bottle which pass through the reflected light path as the mirrored line is rotated (Tr. 369-391, 586-596).

The principal differences between the optical system of the San Marino machine and that disclosed in the patent-in-suit are:

- (i) San Marino "folds its optics", i.e. the mirrored line reflects light to the photocell rather than passing the light directly to the photocell (Tr. 369);
- (ii) Instead of alternate translucent and opaque sections in the circular reticle shown in the patent, San Marino has only a single reflective line in the otherwise non-reflective rotatable member;
- (iii) San Marino includes an added feature of "wobblulating" the mirror during rotation to detect particles in the neck of the bottle (Tr. 366-369).

The effective equivalence of the reflective and refractive optics and the equivalent production of pulses by the '640 system and the San Marino system were demonstrated to the District Court with a specially built machine (Exh. AA) described and demonstrated by Calhoun at pages 404-427 of the transcript. The photographs (Exh. DD) were made to show the resulting comparisons in signals of those produced by the system of the patent-in-suit and those produced by a system similar to that of the San Marino machine.



(b) The San Marino Signal Processing System

When the bottle is clean, the spinning of the disc with its mirrored line produced no change in the total amount of light which passes to the photocell through the bottle and the reticle (Tr. 369-391, 586-596). However, should a foreign particle appear in the bottle, the covering and uncovering of the particle by the non-reflective area of the disc segment of the reticle will result in the production of an alternating variation in the amount of light reaching the photocell (Tr. 369-391, 586-596). Such alternating variation causes the photocell to produce a signal pulse with alternating current characteristics corresponding to the characteristics of the light reaching the photocell (Tr. 369-391).

As in the '640 patent system, electronic circuitry is provided in the San Marino machine for separating the alternating current signals or pulses from the direct current signals and for individually processing the alternating current signals of pulses and individually processing the direct current signals (Tr. 369-391, 586-596, 1132-1133). For example, the alternating current signals and the direct current signals are amplified by the amplifier stage including the transistor Q17 in Exhibit AD (Tr. 369-391, 586-596, 1132-1133). The direct current signals are then directed to the direct current amplifier including the transistor Q1 (Tr. 390-391). The amplifier then directs the signal to a threshold detector which passes the signal when the signal has characteristics corresponding to a DC level less than

a particular value at the photocell (Tr. 389-392). This indicates that the bottle being inspected is undesirably opaque or that there is a large particle in the bottom of the bottle (Tr. 369-391).

The amplified alternating current is passed by the capacitor C-9 to a plurality of amplifier stages including the transistors Q16, Q15 and Q14 (Tr. 1133-1140). These amplifiers operate to pass the signal components substantially only at the frequencies representing the particles (Tr. 1133-1140). In other words, the amplifiers discriminate the signals representing undesirable effects, such as edge effects and lettering and stippling at the bottom of the bottle, which cloud the effects of the particles (Tr. 1133-1140). If the signals at the frequencies representing the particles have an amplitude greater than a particular value, the signals are detected so that an output signal is produced (Tr. 586-596). This output signal is directed to the threshold detector to provide for a rejection of the bottle (Tr. 586-596).

The threshold detector passes a reject signal when there is a small foreign particle in the bottom of the bottle or when the bottle is opaque or there is a large foreign particle in the bottom of the bottle (Tr. 586-596). The threshold detector is effective in passing this reject signal only in the period of time when the center of the bottle is being conveyed from a position slightly in front of the center line extending through the light source, the lens and the center of the mirror to a

position slightly in back of this center line (Tr. 1761-1777). The reject signal from the threshold detector is effective in causing a bottle to be rejected.

7. The District Court's Conclusions of Law on the
 Issues of Validity and Infringement of the
 Patent-in-Suit

The District Court ruled in favor of defendant on the several technical grounds which plaintiff had asserted to invalidate the patent-in-suit or to prevent defendant from enforcing it, and also on the issue of patent misuse (see Conclusions Nos. 1, 14, 15, 16, 17; R. 1954-1957). But on the main issues of validity and infringement, the District Court concluded as set forth in Appendix C.

C. QUESTIONS INVOLVED IN THE APPEAL OF DEFENDANT-
 APPELLANT

The appeal of defendant-appellant presents four principal questions and a number of subsidiary questions, the determination of which subsidiary questions should enable the Court of Appeals to resolve the four principal questions. The principal questions are as follows:

1. Whether the District Court erred in holding invalid Claims 7 to 15, inclusive, and 17 to 24, inclusive, of United States Letters Patent No. 3,133,640, and in the reasons which the District Court stated to support such holding.

2. Whether the District Court erred in holding that plaintiff has not infringed any of the claims of said Letters

Patent, in making and selling its Models SME 303 and SLIMLIGHT machines, and in the reasons which the District Court stated to support such holding.

3. Whether the District Court erred in holding that defendant's counterclaim against plaintiff for infringement of said Letters Patent should be dismissed.

4. Whether the District Court erred in ordering that plaintiff should recover from defendant its costs incurred in connection with that portion of the trial relating to the issues of patent validity and infringement.

The subsidiary and specific questions which are raised by the present appeal are:

Whether the District Court erred in holding that:

(1) The circuitry disclosed in the said Letters Patent is the essence of the patent disclosure insofar as the use of AC is concerned, or whether such circuitry should have been held only to constitute an embodiment of the invention of said Letters Patent.

(2) The said Letters Patent does not cover a machine with a disc having a single reflective line with the remainder of the surface being non-reflective.

(3) Although producing an alternating current signal, plaintiff's machine is concerned only with the initial slope of the first pulse thereof and is not concerned with matters of frequency or repetitive pattern.

(4) All of the claims of the said patent in employing terms such as "reticle", "disc", "scanning means", "annular member", or the like mean a reticle including at least two radial opaque areas and two translucent areas.

(5) The prior art by which the obviousness or non-obviousness of the invention of the said patent is to be judged, is that relating broadly to the detection of foreign objects in a field of view by electro-optical techniques, rather than that art relating specifically to bottle inspection.

(6) Electro-optical systems for the detection of objects in the sky, the detection of material moving on a conveyor, the detection of the presence of objects moving on the ground, and detection of objects in a container are all systems which reside in an analogous art.

(7) The detection circuitry of plaintiff's machines is not concerned with rendering a repetitive alternating current signal at the output of the photocell, and further the fact that the photocell in plaintiff's machine does set up a repetitive alternating current is irrelevant to the operation of plaintiff's machines.

(8) The rejection of a bottle by plaintiff's machines is not dependent upon an alternating signal of a hoped-for particular frequency or a discriminated band of frequencies, as taught by the patent.

(9) Plaintiff's use of RC circuitry is substantially different from the use of LC circuitry taught by the patent.

(10) The progressive segments of the scan of the scanning member of the plaintiff's machines do not include the center and progressive portions of the periphery of the bottle during at least part of the inspecting period.

(11) The doctrine of equivalents does not apply to plaintiff's machines.

(12) Plaintiff's machines are not concerned with indicating the presence of foreign particles by means of alternating signals in a relevant sense as taught by the said patent.

(13) The scanning area in plaintiff's machines is not "substantially greater" than the size of the particle sought to be detected, in the sense that the quoted words are used in the said patent.

(14) Plaintiff's machines do not use an amplifier means tuned to a specific frequency range or an equivalent amplifier.

(15) Plaintiff's scanning member does not have alternate radial opaque and translucent areas.

D. THE DISTRICT COURT ERRONEOUSLY PREDICATED ITS SECTION 103 HOLDING OF INVALIDITY ON THE ASSUMPTION THAT MISSILE AND STAR-TRACKING PATENTS WERE RELEVANT PRIOR ART TO A PATENT IN THE BOTTLE INSPECTION FIELD

As its only ground, the District Court held the claims in the patent invalid "as being obvious under 35 U.S.C. § 103" (Conclusion No. 12, R. 1956). In order to arrive at this conclusion, however, his Honor was forced to rely heavily upon the missile and star tracking patent to Biberman (see Finding No. 11(a), (c) and (e)). Recognizing this reliance upon such

missile and star tracking patent, the Court stated:

"***The Biberman '405 patent is the only reference specified in paragraphs 11(c), 11(b) and 11(c) of the Findings of Fact that discloses a centered optical system with a radial scan for providing spatial filtering." (Finding No. 11(e), R. 1943).

And in Conclusion No. 13 (R. 1956), the Court stated:

"If the missile and star tracking field cannot be properly considered with the bottle inspection field as a single art of detecting objects in a field of view by electro-optical techniques, the system disclosed and claimed in the '640 patent constitutes an invention over the prior art relating to bottle inspection, and the patent is valid."

By including Conclusion No. 13 and by other statements in the record (Tr. 2605), the District Court, thus, candidly expressed its own doubts as to the propriety of invalidating the '640 patent on the basis of a patent in the missile or star tracking field. Defendant-appellant submits that such doubts were well conceived.

1. Under Controlling Authorities, the Prior Art to Determine the Validity of a Patent on an Invention is that Group of Prior Patents and Publications and Devices which would normally be known to, or consulted by, a man of ordinary skill in the particular business to which the Invention pertains

Section 103 reads as follows:

"§ 103. Conditions for patentability; non-obvious subject matter"

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

The term "prior art" is undefined in the patent statutes. However, the "obviousness" rendering a patent invalid (or not obtainable) under § 103 must be predicated upon a finding of such insufficient "differences between the subject matter sought to be patented" and the thus-undefined "prior art" that "the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains".

But in the case at Bar, what is the scope of the art to which the subject matter - namely, a bottle inspection system - pertains? Is this scope limited to the bottle inspection field; or may it be properly viewed as a broader art, i.e. the detection of objects in a field of view by electro-optical means, as the District Court concluded (Conclusion No. 5, R. 1955). The

latter categorization is strictly academic in character. It is not one based upon the realities of the business in which the invention was made and the problems which the three joint inventors sought to solve. Under the most recent pronouncement of the Supreme Court of the United States, as well as under many other authorities, the knowledge of the person having ordinary skill in such business - here bottle handling, including bottle inspection - should determine the scope of the relevant art. The scope of the relevant art is not determined by some artificial category in which all items having some similar physical or mechanical similarities may be thrown.

Thus, in Graham v. John Deere, 383 U.S. 1, 86 Sup. Ct. 684 (1966), in his opinion for the Supreme Court where he explained the decisional law which § 103 was attempting to codify, Mr. Justice Clark, referring to Hotchkiss v. Greenwood, 11 How. 248, 13 L.Ed. 653, stated:

"Hotchkiss, by positing the condition that a patentable invention evidence more ingenuity and skill than possessed by an ordinary mechanic acquainted with the business, merely distinguished between new and useful innovations that were capable of sustaining a patent and those that were not. * * * In practice, Hotchkiss has required a comparison between the subject matter of the patent, or patent application, and the background skill of the calling. It has been from this comparison

that patentability was in each case determined."

(383 U.S. 11-12, 86 S.Ct. 692-693)(emphasis supplied).

After analyzing the legislative history of § 103, Mr. Justice Clark continued:

"* * * We conclude that the section was intended merely as a codification of judicial precedents embracing the Hotchkiss condition, with congressional directions that inquiries into the obviousness of the subject matter sought to be patented are a prerequisite to patentability." (383 U.S. 17, 86 S.Ct. 693).

Although the Supreme Court held invalid both the plow patent and the sprayer patent there before the Court, it did so on the basis of prior plow and sprayer patents respectively, and not by reference to patents found in some other field to which a man of ordinary skill in either the plow or sprayer business would never think to turn to solve problems in his particular business.

From the above discussion, it will be seen that the missile and star tracking field should not be considered with the bottle inspection field as a single art of detecting objects in a field of view. However, the question still remains as to whether the missile tracking field is analogous to the bottle inspection field since the District Court held to this effect in Finding No. 10.

In the case at Bar, the District Judge, in his conclusions of law, properly stated the test of whether one art is

to be considered analogous to another. Thus, in Conclusion No. 5 (R. 1954), it is stated:

"5. Whether arts are analogous depends upon the similarity of their elements and purpose. If elements and purpose in one art are so related and similar to those in another art that the relationship would appeal to the mind of a person having mechanical skill and knowledge of the purposes of the other, then the arts may be said to be analogous*****."

This statement of the law by the District Court is amply supported by the authorities: See for example:

Stearns v. Tinker & Razor, 220 F.2d 49, 56, 57

(CA9, 1955) cert. denied 350 U.S. 830

76 S.Ct. 62

Alcoa v. Sperry Products, Inc. 285 F.2d 911, 917

(CA6, 1960) cert. denied 368 U.S. 890

82 S.Ct. 142

The complaint of defendant-appellant, however, is that the District Court improperly applied the thus-stated principle of law to the facts in the case at bar.

2. Missile and Star Tracking Patents would not ordinarily be looked to by a man of ordinary skill in the Bottle Inspection Field to solve problems encountered by him in such field

The District Court found in Finding No. 10 (R. 1941) that the missile tracking and bottle inspection fields are analogous. However, the District Court did not find that the patents relating to missile or star tracking would appeal to the mind of a person having ordinary mechanical skill and knowledge in the field or business in which the invention in question was made -- namely, the field of bottle inspection-in solving problems encountered in the latter field. Indeed, such a finding could not have been made on the evidence adduced at the trial. Yet, without such a finding, the Court could not properly have concluded that the missile or star tracking field and the bottle inspection field are analogous.

Actually, it would not have been natural for a person having ordinary skill in the field of bottle inspection to have looked to the field of missile and star tracking for help, when faced with the problem of detecting foreign particles in the bottoms of the bottles moving down conveyor lines at a rate as high as 600 per minute. Plaintiff did not introduce any evidence, through plaintiff's experts Husome, Ryde and Greist or through plaintiff's cross-examination of Calhoun, to show that the two fields are analogous. In the complete absence of any such evidence and their obvious remoteness from the business standpoint, appellant submits that the District Court

erred in considering the missile and star-tracking technology as relevant prior art to a bottle inspection patent.

There are, actually, considerable differences between the fields of bottle inspection and missile and star tracking. The detection of a missile or star tracking occurs against a substantially homogeneous background, that is, against a clear sky. Admittedly, clouds or other stars may be present in the sky background (Biberman patent Col. 1, lines 21-36, Col. 2, lines 29-49) but these clouds or stars cause signal components to be produced which are relatively small in intensity and are easy to distinguish from the primary signal produced by the missile or star that the apparatus is directed to follow. It is thus relatively easy to detect and isolate the signal components representing the missile or the star. The detection of a missile or star tracking against a substantially homogeneous background is consistent with the definition of spatial filtering by Dr. Greist (Tr. 2287).

In contrast, detection of a particle at the bottom of a bottle occurs in a non-homogeneous field in the bottle-inspecting systems. In other words, the particle has to be detected against a background which includes shadows produced by the edge of the bottle and by lettering and stippling at the bottom of the bottle (Tr. 2365-2366). The shadows resulting from the edge of the bottle cause signal components to be produced which are much greater in amplitude (or intensity) than the signals produced by the small particle at the bottom of the bottle

(Tr. 199-207, 498-499, 2375-2379. See also Exhibits CY and CZ where the signals produced by the edge of the bottle have low frequencies and high amplitudes in comparison to the signals representing the particles in the bottle). Furthermore, the particles have to be detected in the closely confined space defined by the perimeter of the bottle and further have to be detected as the bottles are moved at a relatively rapid rate such as 600 bottles per minute (or 10 bottles per second) along a conveyor line (Tr. 127). Thus, the problems to be solved in detecting a particle in a bottle are quite different from those involved in tracking a star or a missile.

If anything, the evidence adduced at the trial strongly supports a finding that a person of average skill in the bottle inspection field would never have thought to look to missile and star tracking technology. Thus, plaintiff produced as a witness, a Mr. Stoate, who was not merely a person of ordinary skill in the bottle inspection field, but one who had spent some thirty years therein and had obtained some seven patents on different inventions both in Great Britain and the United States. Although Stoate patent 517,229 applied for in 1938 may be considered to disclose a centered optical system in the bottle inspection field, the later Stoate patents reveal that he looked to other fields such as television (Tr. 1934) in his unsuccessful efforts to devise a bottle inspector, and he never ever considered missile and star tracking technology. Stoate further admitted that his centered reticle system was for use with a DC system and produced no spatial filtering (Tr. 2030).

The inability of a person of ordinary skill in the field of bottle inspection to comprehend the possible applicability of technology in the missile and star tracking field may also be seen from the extreme attempts made in the bottle inspection field, prior to the '640 patent, to avoid the effects of the edge of the bottles. In the prior art, attempts were made to mask the edge of the bottles so that the edge effects were eliminated (Tr. 2045-2047). As an alternative, the scan of the bottles never reached the edge in the systems of the prior art (Calhoun Tr. 232-247). In both alternatives, signals were never generated at the edge of the bottles since it was impossible to deal with such signals.

Further, had a person of ordinary skill in the bottle inspection field consulted an expert in the missile field as to the significance of the composite signals produced by scanning the bottom of the bottle, he would have received no solace. Even an expert like Dr. Greist, with a doctorate in physics and many years of distinguished experience in the missile tracking field, did not appreciate the significance and effect of the signal components produced by defendant's centered reticle system for bottle inspection (Tr. 2249-2260). In effect, Dr. Greist did not appreciate that the edge effects in the bottle were causing signal components to be produced at the low frequencies and that these signal components were concealing the signal components representing the particles in the bottle. As Dr. Greist further testified on page 2259 of the transcript, he would be happy to be

informed as to why the low frequency components existed. It was thus not obvious to Greist, and he had no opinion on this matter, even after he had the opportunity of discussing the case with counsel for plaintiff to prepare for his testimony in this trial.

Since neither Greist nor Stoate appreciated the combination of spatial filtering and electronic frequency selection to detect particles at the bottom of empty bottles, how could a person of ordinary skill in the field of bottle inspection be expected to appreciate the significance of adapting any teachings in prior patents in the field of missile and star tracking to produce a bottle inspecting system which would be able to scan a bottle to produce a utilizeable signal representing a particle in the bottom of the bottle?

Actually, plaintiff had the burden of establishing that missile or star tracking and bottle inspection constituted analogous arts. No testimony on this was offered by plaintiff's president, Husome, or by plaintiff's experts, Ryde and Greist. Since plaintiff offered no evidence on this during the trial, plaintiff did not assume the burden.

The non-analogous relationship between the missile and star tracking field and the bottle inspection field may be seen from the patents in these fields. None of the missile patents had any patents relating to bottle inspection systems cited as prior art (Exh. DA); nor, prior to the '640 patent-in-suit, did

any of the patents in the bottle inspection field (Exh. CS) have any patents relating to missile or star tracking cited as prior art. It was only when the disclosure of the application for the patent-in-suit showed the use of a centered reticle system, that the patent examiner recognized it as having an ancestor in the missile and star tracking field and cited patents from the latter field against the application.

Although patents relating to missile tracking were cited against the '640 patent during the prosecution of the '640 patent in the United States Patent Office, defendant constantly contended in the Patent Office (Exh. 40) that the missile tracking field was not analogous to the bottle inspection field. While the Examiner in the Patent Office never formally agreed with defendant in defendant's contention, since the '640 patent eventually issued, there is at least a strong inference that the Examiner eventually accepted defendant's position.

That the invention of the patent-in-suit was a very substantial contribution to the art is attested by its widespread commercial success (Finding No. 12(b); R. 1943) and the fact that all prior empty bottle inspectors in this country practically disappeared from the market in favor of defendant's machines and by the two other machines which were later devised by Wyman and his assistant Husome (Tr. *118, 903-910), both with knowledge of machines built on the teachings of the patent-in-suit.

In these circumstances for the District Court to hold the patent invalid on an asserted obviousness by combining --

through hindsight -- the teachings of both bottle inspection and missile and star tracking arts, represents a complete disregard of the situation from the eyes of persons of ordinary skill in the bottle inspection field. It further represents an erroneous destruction of a very valuable patent under the tests even recently reiterated by the Supreme Court of the United States in the Graham v. John Deere case, discussed supra, and many other authorities.

E. THE DISTRICT COURT ERRED IN FAILING TO FIND THAT PLAINTIFF'S MACHINE INFRINGED THE PATENT-IN-SUIT

1. Having Decided that the Patent was Invalid under an Erroneous View of what constituted Pertinent Prior Art, the District Court Compounded its Error by Adopting a Narrow View of the Scope of the Invention

Once the District Court was persuaded that the prior art should be defined broadly as the detection of objects by electro-optical means (which definition would comprehend missile and star tracking patents as prior art pertinent to the invention of the patent-in-suit), his Honor could not find that said invention represented a substantial advance over the prior art as thus broadly defined. The Court could, and did, find that each element of the particular embodiment disclosed in the patent could be found to have some counterpart in such broadly defined prior art (See Finding No. 11, R. 1942-1943).

2. When the Prior Art is Limited to Patents in the Field of Bottle Inspection, the Invention of the Patent-in-Suit will be Found to Represent a Great Advance in such Field

As appellant has hereinabove urged, the pertinent prior art relates to the business of bottle inspection, as the opinion in the John Deere case, decided by the Supreme Court, indicates (see quotations, supra, pages 37 and 38) and does not properly include missile and star tracking patents. Because of this, the invention of the patent-in-suit will be found to represent a most substantial advance over the bottle inspection prior art. This was the first time that anyone had provided a system for detecting particles in bottles while scanning the edges of the bottles. It was also the first time that anyone had provided for inspecting bottles or other articles by means of a centered optical system, to provide spatial filtering, in combination with electronic processing of the signals generated through such spatial filtering, to discriminate between signals representative of a particle and signals caused by other discontinuities in the bottom of the bottle, particularly the signals generated by the edge of the bottle. This bottle inspection system of the patent-in-suit was, thus, a completely new approach to the problems theretofore encountered by persons in this field, including such industrial giants as RCA, Coca-Cola, Westinghouse and others whose names appear as assignees of prior bottle inspection patents (See the collection of patents constituting Exhibit CS). The considerable advance provided by the system of the patent-in-suit is attested by the fact that the only three machines on the market today all have some demonstrable connection with the work of the three inventors of the patent-in-suit.

3. In Construing a Patent for the purpose of determining whether it is Infringed, a Court should make every effort to accord it such Scope as is commensurate with the Advance its Invention had made over the Prior Art

The entire doctrine of equivalents, so ably explained by the Supreme Court of the United States in Graver Tank & Mfg. Co. Inc. v. Linde Air Prods. Co., 339 U.S. 605, 70 S.Ct. 854, represents a specific effort on the part of the courts toward carrying out the policy of construing a patent to render its scope coincident with its contribution to the art.

It is thus essential that a Court, faced with the question of infringement of a patent, first determine the extent of the contribution of the inventors of the patent to the art. In so doing, the Court is simultaneously undertaking the factual inquiry upon the results of which it may or may not conclude, as a matter of law, that the subject matter patented meets the requirements of § 103 of Title 35, U.S.C., discussed supra, pp. 34-35. To this extent, then, the Court must approach the issue of infringement simultaneously with the issue of patentability from the standpoint of § 103.

4. The District Court Erroneously First Determined the Issue of Infringement Apart from that of Validity under § 103

As appears from the District Court's colloquy with counsel during oral argument (Tr. 2545-2548 on April 17, 1967), the District Court apparently had first determined the issue of infringement adverse to appellant wholly apart from determining

the contribution of the system of the patent over the prior art. Indeed, his Honor questioned whether, if he found non-infringement, it would be necessary for him to rule on the question of the validity of the patent (Tr. 2545-2548). It was only after receiving an affirmative answer to this inquiry and having indicated why he had tentatively found no infringement, that the Court then proceeded to take up the issue of the validity of the patent (Tr. 2545-2548). In other words, the Court actually had arrived at a conclusion respecting infringement without first determining the advance which the patent system represented over the prior art -- a determination which he later proceeded to make under § 103, when dealing with the validity of the patent.

5. The District Court did not Understand the Difference between the "Invention" of the Patent and the "Embodiment" of the Invention therein Disclosed

In thus reaching the conclusion that the patent-in-suit was not infringed without first ascertaining the advance made by the patent system over the bottle inspection systems disclosed in prior patents, the District Court had only attempted to understand the particular embodiment of the invention disclosed in the patent and had assumed that the scope to be accorded the patent was limited essentially to such patent embodiment (Tr. 2587-2607 and 2644-2650). Therein, appellant submits, the District Court committed a most serious error.

The distinction between the "invention" of a patent and the preferred embodiment (or in the 1952 Act "the best mode

contemplated by the invention of carrying out the invention" [35 U.S.C. §112]), has long been recognized by the Courts.

See: King-Seeley Thermos Co. v. Tastee Freez Industries, Inc., 357 F.2d 875 (CA7, 1966)

American Technical Machine Corp. v. Caparotta, 339 F.2d 557 (CA2, 1964)

American Photocopy Equipment Co. v. Ampto Inc., 82 N.J.S. 531 (1964), 198 A.2d 469

Under §112, it is required only that the patent specification contain a description of the "invention", and of the manner of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and that the patent specification set forth "the best mode" contemplated by the inventor of carrying out his invention. Thus, inherent in this statutory section is a recognition of the difference between "the invention" patented and the "best mode" contemplated by the inventor of carrying out his "invention".

In their effort to comply with §112, the three joint inventors went to great length in the specification of the patent-in-suit to disclose the particular embodiment of the invention which they had built and sold -- the best mode contemplated by the three joint inventors of carrying out their invention. The District Court concluded:

"***Further, the Court concludes that the description contained in the patent in suit is sufficiently clear and

concise to enable one skilled in the art to construct the disclosure thereof." (Conclusion No. 15, R. 1957).

But the full extent of "the invention" can only be appreciated by comparing that particular embodiment with the devices disclosed in the prior patents and publications relating to bottle inspection. This the District Court did not do. Instead, his Honor regarded the particular machine embodiment disclosed in the patent as "the invention" and determined the issue of equivalence with respect to such embodiment. Thus, in Finding No. 22 (R. 1947), the Court stated:

"22. Plaintiff's machines (the allegedly infringing 303 and Slimlight) seek the same end result of detecting foreign particles in a container as does the machine described in defendant's patent. However, the means employed by the SME devices to reach this end result are dissimilar from those taught by the patent-in-suit. The enumerated respects in which the Court finds them dissimilar are set forth in rather telegraphic reference to the wording of the following claims:" (emphasis added)

The District Court then proceeded to enumerate certain respects in which it found that plaintiff's machines did not meet the language of the claims relied upon by defendant. Defendant deals below with the principal distinctions thus enumerated by the District Court. But it should be pointed out that the District Court's approach to the issue of equivalency was at the level of the specific mechanical and electronic

means of the "best mode" embodiment disclosed in the patent, instead of to the basic and novel concept of "the invention" of the patent-in-suit for detecting particles in empty bottles. Had the District Court understood "the invention", as distinguished from "the best mode" specifically disclosed, his Honor should have seen that plaintiff's machine employs such basic system and that the particular mechanical and electronic means employed in each instance were selected by plaintiff to enable its machine to operate in such system. Thus:

(a) Plaintiff's machine admittedly accomplishes spatial filtering by a centered optical system by which light is passed through the bottle being inspected and reaches the photocell under the control of a rotating member having at least one light segment and at least one dark segment (Tr. 525-535; 567- 570).

(b) Plaintiff's machine admittedly separates the DC signal component from the AC signal component of the signal developed at the output of the photocell and uses a predetermined decrease in the DC voltage to indicate a dark colored bottle or the presence of a large particle in the bottle (Tr. 585-596).

(c) The AC or pulse component is then electronically processed to differentiate between a signal component indicating the presence of a particle and signal components caused by other discontinuities in the bottle being inspected (Tr. 546-559, 585-597).

These are the same basic system steps which are accomplished by the machine disclosed in the patent-in-suit, and

which were never conjointly accomplished by any prior bottle inspection system patents. When this fact is fully appreciated, it may readily be seen that plaintiff's machine does perform "substantially the same function in substantially the same way to obtain the same result" under the tests laid down by Sanitary Refrigerator Co. v. Winters, 280 U.S. 30, 42 and Graver Tank & Mfg. Co., Inc. v. Linde Air Products Co., 339 U.S. 605. Whether the details by which (a) is accomplished, e.g. by reflective or refractive optics or by a single spoke or multiple spoke reticle; and by which (c) is accomplished, e.g. by RC or LC circuits or by a pulse or alternating current signals or by a wide band or a narrow band attenuation, should not be regarded as negating the equivalence of plaintiff's machine system to that basic system taught by the patent-in-suit, and thereby avoid infringement. To do so, as the District Court did here, is to disregard the following language of the Supreme Court of the United States:

" * * * But courts have also recognized that to permit imitation of a patented invention which does not copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing. * * * Outright and forthright duplication is a dull and very rare type of infringement. To prohibit no other would place the inventor at the mercy of verbalism and would be subordinating substance to form. It would deprive him of the benefit of his invention and would foster concealment rather than

disclosure of inventions, which is one of the primary purposes of the patent system."

Graver Tank & Mfg. Co., Inc. v. Linde Air

Products Co., 339 U.S. 605, 70 S.Ct. 854, at p. 856

Furthermore, the inventors actually reduced to practice embodiments incorporating the essential differences between plaintiff's machine and defendant's machine prior to the time that the '640 patent was filed. After reducing to practice embodiments incorporating the features of plaintiff's machine, the inventors reduced to practice the embodiment disclosed in the '640 patent and disclosed this embodiment because of the belief that it had certain advantages over the prior embodiments. The inventors certainly could not have intended to limit the disclosure to the particular embodiment in the '640 patent in view of the fact that they had previously reduced to practice other embodiments.

Bearing in mind the District Court's errors in its approach to the issue of infringement, i.e., its failure to appreciate that the particular machine disclosed is only "the best mode" of practicing the inventions and not the invention itself, and its failure to determine equivalence with reference to the basic inventive system and not with respect to mechanical and electronic details, we deal below with the Court's errors in reference to such details.

The discussion below relates to the narrow interpretation of the language of the claims by the District Court. In



Appendix D, defendant has provided an analysis of the different references used by the District Court and an analysis of the differences between the system of the patent-in-suit and such references.

6. The District Court Erroneously found that Plaintiff's Machines did not Infringe the Intent or the Language Expressed in the Claims

(a) The District Court Erroneously found that the '640 patent did not Disclose a Reticle with a Single Spoke

It is difficult to conceive that the '640 patent should be limited to a multi-spoke reticle. This is especially true since the same principles apply to a single-spoke reticle as to a multi-spoke reticle. Furthermore, the patentees successfully operated their bottle inspector with single-spoke reticles prior to filing the '640 patent in the Patent Office (Tr. 481-486). Because of this, it would have made no sense for the patentees to limit the '640 patent to a multi-spoke reticle.

Actually, the '640 patent infers in the specification that a single-spoke reticle may be used. This may be seen from Column 5, lines 39 to 45, inclusive, which is quoted as follows:

"The essence of these various reticle patterns is that a reticle be positioned and rotated in front of a photocell so that all of the information bearing light or light from the area being inspected passes through the reticle to the photocell and the reticle pattern is such that in the area being inspected any point is scanned by an alternate opaque and translucent area of the reticle."

Even a reticle with a single spoke falls within this definition since this reticle scans any point in the field of view alternately with an opaque area and a translucent area in each revolution of the reticle.

The obvious inclusion of a single-spoke reticle within the concept of the invention may also be seen from the testimony of plaintiff's experts, Ryde and Greist. As both Ryde and Greist testified, Exhibit CL is the same as the San Marino reticle except that the light-passing line extends diametrically across the reticle instead of terminating at the center of the reticle (Tr. 1760, 1842-1845, 2221-2222). Because of this, Exhibit CL produces pulses of the same wave shape as the San Marino reticle but produces these pulses at twice the frequency of the San Marino reticle (Tr. 1842-1845, 2221-2222).

In effect, Exhibit CL is the same as the San Marino reticle except that it has two diametrically disposed reflecting lines instead of one radially disposed reflecting line as in the San Marino machine. Furthermore, both Ryde and Greist testified that Exhibit CL is within the concept of the '640 patent (Tr. 1760, 1842-1845, 2221-2222). Since Exhibit CL is within the concept of the '640 patent, it follows that plaintiff's single-spoke reticle also falls within that concept.

- (b) The District Court Erroneously found
that San Marino does not produce
Alternating Current within the
Relevant Sense of the '640 patent

The District Court found that "plaintiff's machines are not concerned about rendering an alternating current signal



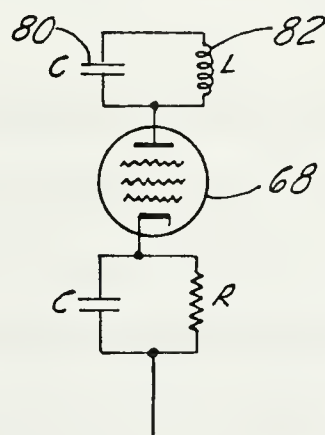
output, nor is the rejection of a bottle based upon an alternating current in a relevant sense as taught by the patent-in-suit" (R. 1952). This finding by the District Court appears to be the primary basis for the ruling that the San Marino machine does not infringe the '640 patent. It is the only basis for the finding by the District Court that Claim 22 in the '640 patent is not infringed.

This finding by the District Court with respect to non-infringement is based upon a change of a single electrical element in a complex piece of equipment which probably has more than one hundred electrical elements. The change in the single electrical element does not cause any change in the operation of the system of the patent-in-suit relative to the system of plaintiff's machine since both machines provide frequency selection or discrimination (Tr. 1289-1293).

Frequency selection or discrimination may be accomplished by several well-known means. One of such well-known means constitutes a combination of a coil (also called an "inductor") and a capacitor (Tr. 319-323, 333-334). The coil is designated symbolically as "L" and the capacitor is designated symbolically as "C" so that the circuit is often designated as an "LC" circuit (Tr. 333-347). In Figure 4 of the patent, the coil 82 and the capacitor 80 constitute an "LC" circuit for tuning the amplifier 50 to pass signals at the frequencies representing the particles in the bottom of the bottle and to reject the signals at the

frequencies representing edge effects and other undesirable effects in the bottom of the bottle (Col. 4, lines 54-65 of patent 3,133,640).

Another of such well-known means for accomplishing frequency discrimination constitutes a combination of a capacitor and a resistor (Tr. 337-348, 385). Since the resistor is designated symbolically as "R", the combination of the capacitor and the resistor is represented as an "RC" circuit (Tr. 348). Just as the LC circuit formed by the coil 82 and the capacitor 80 in the patent-in-suit are connected to the top electrode of the tube 68 in Figure 4, an RC circuit is connected to the bottom electrode of the tube in Figure 4 (Tr. 340-351). This may be seen from the following illustration of a portion of the circuit in Figure 4 of the drawings in the patent-in-suit:



In the amplifier shown in Figure 4 of the drawings in the patent-in-suit, frequency selection is accomplished primarily by the LC circuit since the LC circuit passes the signals at the frequencies representing the particles in the bottom of the bottle and attenuates the signals at the other frequencies (Tr. 333-351). However, since the signals produced at the low

frequencies by the edge and other effects in the bottom of the bottle have a relatively great amplitude, further attenuation at these frequencies is desirable (Tr. 340-351, 856,860). This is accomplished by including the RC circuit to further attenuate the signals at the relatively low frequencies (Tr. 340-351).

Furthermore, in developing their bottle inspection system to the form disclosed in the '640 patent, the inventors at times used RC circuits to select the frequencies representing particles in the bottom of the bottle from undesirable effects which produced signal components at other frequencies (Tr. 267, 2371-2374). The system operated satisfactorily when the RC circuits were used (Tr. 267, 2371-2374). The inventors used the RC circuits in the '640 system before the filing of the patent application which matured into the '640 patent (Tr. 267, 2371-2374).

Plaintiff uses an "RC" circuit in its machine for frequency selection instead of an "LC" circuit. In other words, an inductance "L" in the amplifier of the '640 patent is changed to a resistance "R" in the amplifier of the San Marino machine. It is difficult to conceive that one would avoid a patent as basic as the '640 patent by changing a single electrical element in a complex structure. (See Neff Instrument Corporation v. Cohu Electronics, Inc., 298 F.2d 82, 89 (CA9, 1961), where the equivalence of "LC" and "RC" circuits was recognized by this Court)

The use by San Marino of an "RC" circuit and the use in the embodiment of the '640 invention of an "LC" circuit are dictated in large part from an electronic standpoint by the number of spokes on the reticle. In the embodiment of the '640 patent, a multi-spoke reticle is used, preferably with seven spokes. When the seven-spoke reticle is rotated at a frequency of 157 cycles per second, the signal components representing the particle in the bottom of the bottle have a basic frequency of $7 \times 157 = 1199$ cycles per second and also have frequencies which are multiples of 1199 cycles per second (Tr. 190-201, 1707, 1710, 2228). The basic frequency of 1199 cycles per second is considerably removed from the signal components at frequencies of 200 cycles per second and less, representing undesirable effects such as the shadows caused by edge effects in the bottom of the bottle (Tr. 2228-2234). The frequency of 1199 cycles per second is also considerably removed from the signal components at frequencies of approximately 5000 to 15000 cycles per second, representing lettering and stippling at the bottom of the bottle.

For the reasons enumerated in the previous paragraph, in the particular embodiment of the invention disclosed in the patent-in-suit, only the signal components at approximately 1199 cycles per second have to be selected to determine the occurrence of a particle at the bottom of a bottle (Tr. 2364-2376). Actually, the embodiment of the '640 patent is advantageous because the spatial filtering provides the major action in producing the signal components representing a particle



in the bottom of a bottle, so that the burden on the electronics in selecting such signal components is minimized (Tr. 2364-2376).

By way of comparison, the San Marino reticle rotates at a speed of 200 cycles per second and has a single mirrored line (Tr. 532-538). This causes the San Marino machine to produce signal components at a basic frequency of 200 cycles per second and at harmonics of 400, 600, 800, etc. in representation of a particle at the bottom of a bottle (Tr. 546-551). Furthermore, the amplitude (or intensity) of the signal components at 200 cycles per second is slightly greater than the amplitude of the harmonic at 400 cycles per second; and the amplitude of the harmonic signal components at 400 cycles per second is slightly greater than the amplitude of the harmonic at 600 cycles per second, etc. (Tr. 2241-2256). Accordingly, it is desirable to pick up the signal components at 200, 400, 600, etc. cycles per second in order to obtain a signal of optimum strength (Tr. 2241-2256). An "RC" circuit is effective in picking up the signal components of the basic and the several utilizable harmonic frequencies although an "LC" circuit, broadly tuned over the desired frequency range, might also be used (Tr. 2232-2234). Thus, San Marino used an "RC" circuit to provide frequency selection because San Marino employed a scanning reticle with a single mirrored line.

"RC" circuits were commonly known prior to 1958 to provide frequency selection in the manner obtained by San Marino in its machine (Tr. 2271-2272). Furthermore, men skilled in



the electronics art generally appreciate that "LC" circuits and "RC" circuits may be used interchangeably to select particular frequencies although one may provide a different degree or characteristic of frequency discrimination over that obtainable by the other (Tr. 344-345, 2232-2234). Since the single-spoke reticle of San Marino is within the scope of the '640 patent and since "RC" circuits were commonly known prior to 1958, the '640 patent would embrace the combination of a single-spoke reticle and the use of "RC" circuits to replace "LC" circuits. This is particularly true since the embodiment of the '640 patent included "RC" circuits to provide frequency selection for attenuating the signal components at the frequencies representing undesirable effects such as the shadows produced by edge effects at the bottom of the bottle (Tr. 340-351, 2230-2232).

The District Court considered that the San Marino machine responded to "pulses" rather than to "alternating current in a relevant sense as taught by the patent-in-suit". The term "alternating current" has a number of different meanings dependent upon the situation in which it is used. For example, the term "alternating current" in one interpretation means a sinusoidal signal at a particular frequency (Tr. 132-138, 2223). The term in the broad sense means any type of variable signal to distinguish it from a steady state (or dc) signal (Tr. 138-154, 1738-1746, 2223). In this interpretation, a "pulse" would be included within the definition of "alternating current" as constituting a form of "alternating current", as both Ryde and Greist admitted (Tr. 1745, 2223). In any event, even plaintiff's

witnesses admitted that a pulse at least had alternating components (Tr. 1295-1305, 1323-1347, 1738-1746, 2223-2224).

As used in the '640 patent in Column 2, lines 61 to 54, inclusive, the output from the photocell 24 is described as being "alternating current". However, one skilled in the electronics art would appreciate that the output from the photocell not only includes signal components at the basic frequency of 1199 cycles per second, but also at harmonics such as 3597, 5995, etc. cycles per second (Tr. 2228). Consequently, when the term "alternating current" is used in the patent, it would be understood by any electronics man to mean a signal with alternating components, like a pulse, rather than a sinusoidal signal at a single frequency. This interpretation is supported by the waveforms shown in Figure 3 of the '640 patent since these waveforms represent a "pulse" at the output of the photocell rather than a sinusoidal signal. This interpretation is further corroborated by the testimony of Dr. Greist who stated that the term "alternating current" is generally used by the patent literature to include "pulses" (Tr. 2223).

San Marino successfully urged upon the District Court the interpretation of the sentence in Column 2, lines 51 to 54, inclusive, and the sentence in Column 4, lines 55 to 59, inclusive, to mean that the '640 system is restricted to the production of a single frequency. Because of the fact that harmonics are inherently generated, the interpretation of these sentences should be that the system responds to signal components each having a frequency which is an integral multiple (such as 1, 3, 5, 7, etc.)

of the speed of rotation of the system (157 cycles per second) times the number (7) of alternate light and dark segments, and that the system responds primarily to the signal components at the fundamental frequency of 1199 cycles per second because these signal components have a greater amplitude (or intensity) than the signal components at the harmonic frequencies.

As previously indicated, plaintiff's experts Ryde and Greist testified that Exhibit CL is within the concept of the '640 patent (Tr. 1760, 1842-1845, 2221-2222). As further admitted by Ryde and Greist, Exhibit CL produces pulses of the same shape, but twice as often, as the reticle in the San Marino machine in representation of a particle in a bottle (Tr. 1882, 2256-2261). On this basis, if defendant produces an "alternating current" in its machine, plaintiff obviously produces the same type of "alternating current".

As Ryde testified, both the '640 patent and the San Marino machine produce a train of pulses (Tr. 1742). Ryde further testified that the production of a train of pulses is within the teachings of the '640 system (Tr. 1743). The train of pulses produced by the San Marino machine would be similar to that produced by the '640 system so that, if we want to call such pulses "alternating current", it is a matter of terminology (Tr. 1744). Ryde further testified, it would be reasonable to call the pulses "alternating current" in the San Marino machine if we call the pulses "alternating current" in the '640 system (Tr. 1744).

Therefore, contrary to the finding of the District Court, the testimony of plaintiff's own experts discloses that plaintiff's machines are "concerned about rendering an alternating current signal output", and are also concerned about rejecting a bottle "based upon an alternating current in a relevant sense as taught by the patent-in-suit".

- (c) The District Court Erroneously found that the Rejection of a Bottle by Plaintiff's Machines is not Dependent upon an Alternating Signal of a hoped-for Particular Frequency or a Discriminated Band of Frequencies
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The District Court erroneously found, with respect to Claim 7, that the rejection of a bottle by plaintiff's machines is not dependent upon an alternating signal of a hoped-for particular frequency or a discriminated band of frequencies (R. 1948). However, plaintiff's president Husome admitted that plaintiff's machine provided frequency discrimination to detect a particle in the bottom of a bottle (Tr. 1288-1292). Husome further admitted that plaintiff's machine selected signals having frequencies between 200 cycles per second and 5000 cycles per second to detect such particles (Tr. 508-571, 1311).

- (d) The District Court Erroneously found that Plaintiff's Machines, although Producing an Alternating Current Signal, is concerned only with the Initial Slope of the First Pulse and is not concerned with Matters of Frequency or Repetitive Pattern
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The District Court also erroneously found, with respect to Claim 7, that plaintiff's machines, although producing an

alternating current signal, are concerned only with the initial slope of the first pulse and are not concerned with matters of frequency or repetitive pattern (R. 1948). However, Husome admitted that the slope of a signal is dependent upon the frequency components in the signal (Tr. 1295-1305, 1323-1347). As the slope of the signal increases, the frequency components at the high frequencies increase (Tr. 1323-1347). In effect, the frequency components in the signal control the slope (Tr. 1323-1347).

- (e) The District Court Erroneously found that Progressive Segments of the Scanning Member in Plaintiff's Machines do not, at all times during the Complete Inspection Period, include the Center of the Bottle and Progressive Portions of the Periphery of the Bottle
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The District Court erroneously found that plaintiff does not infringe Claims 9, 18, 20 and 21 because progressive "segments of the scanning member do not, at all times during the complete inspection period, include the center of the bottle and progressive portions of the periphery" (R. 1949, 1950, 1951, 1952). In such finding the District Court has added the phrase "at all times" to language taken from Claim 9.

Actually, as Ryde admitted (Tr. 1761-1777), the San Maino machine directs the energy from the light source to the photocell "along progressive segments of the bottom of the bottle where the progressive segments include the center of the bottom of the bottle and progressive portions of the periphery of the bottle..." (quoting from Claim 9). Ryde further admitted



(Tr. 1761-1777) that this occurs continuously through a period constituting more than one (1) revolution of the reticle or scanning member in the San Marino machine. In each revolution of the reticle or scanning member, plaintiff produces a pulse in representation of a particle in the bottom of the bottle. Since plaintiff requires only a single pulse to reject a bottle (Tr. 2224), plaintiff effectively scans "along progressive segments of the bottom of the bottle where the progressive segments include the center of the bottom of the bottle and progressive portions of the periphery of the bottle".

(f) The District Court Erroneously found that the Scanning Area of the Mirrored Line in Plaintiff's Scanning Member is not "Substantially Greater" than the Size of the Particle Sought to be Detected

The District Court erroneously found that San Marino does not infringe Claims 18 and 21 because the scanning area of the mirrored line in plaintiff's scanning member is not "substantially greater" than the size of the particle sought to be detected (R. 1950, 1952). Admittedly, the scanning area of the mirrored line in the San Marino reticle is not as great as the area of each segment in the reticle of the '640 patent. However, Ryde admitted that the scanning area of the mirrored line in the San Marino reticle is approximately two or three times greater than the areas of some small particles detected by the San Marino machine (Tr. 1801-1806). This is particularly true when the particle is projected on the mirrored line of the San Marino

machine since this tends to decrease the effective size of the particle (Tr. 1804-1806). A relationship of 2:1 or 3:1 between the area of the mirrored line in the San Marino machine and the area of the particle certainly should come within the definition of "substantially greater" in Claims 18 and 21.

(g) The District Court Erroneously found that the San Marino Machines are not concerned with particular Levels, or Magnitudes, of an AC Signal produced by the Photocell as taught by the Patent-in-Suit

The District Court further erroneously found that San Marino did not infringe Claim 18 because the San Marino machines "are not concerned with particular levels, or magnitudes, of an AC signal produced by the photocell as taught by the patent in suit. Plaintiff's machines are responsive only to the rate of change of magnitudes of a pulse and not the ultimate magnitude of the pulses" (R. 1951).

As with most of the Court's findings on the question of non-infringement, this finding is directly opposite to the admissions made by plaintiff's witnesses. For example, Husome admitted that the slope of a signal is dependent upon the frequency and magnitude of the frequency components in the signal (Tr. 1295-1305, 1323-1347). As the slope of a signal increases, the frequency of the signal components in the signal increases (Tr. 1295-1305, 1323-1347). Because of this, "rate of change" is synonymous with frequency selection. As Husome further admitted (Tr. 508-571, 1311), San Marino selected the signal

components between approximately 200 cycles and 5000 cycles per second to detect the presence of a foreign particle in the bottom of a bottle. In selecting the signal components between 200 cycles and 5000 cycles per second, San Marino detected the amplitudes of these signal components to determine the presence of a foreign particle in the bottom of a bottle (Tr. 1295-1305, 1323-1347). Thus, San Marino is "concerned with particular levels, or magnitudes, of an AC signal produced by the photocell".

- (h) The District Court Erroneously found that Plaintiff's Machines do not use an Amplifier Means Tuned to a Specific Frequency Range
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The District Court erroneously found, with respect to Claim 23, that plaintiff's machines "do not use an amplifier means tuned to a specific frequency range" (R. 1953). The District Court predicated this holding upon a hypercritical meaning of the word "tuned". As the District Court admitted in paragraph (b) relating to Claim 23 (R. 1953), the San Marino machines "set up frequencies ranging from 200 to 5000 cycles per second". Certainly the selection of frequencies within a particular range comes within the meaning of the claim or constitutes an equivalence of such meaning.

- (i) The District Court Erroneously found that the Center (Axis) of Rotation of the Rotatable Means is not actually disposed within the Bottom of the Container
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The District Court cited, as one of the reasons for erroneously finding Claims 9 and 24 non-infringed, that the

"center (axis) of rotation of the rotatable means is not actually disposed within the bottom of the container" (R. 1949, 1953). There is a considerable difference between a center of rotation and an axis of rotation. As Ryde admitted, a center of rotation constitutes a single point whereas an axis of rotation constitutes a line (Tr. 1830). Certainly, the reticle in plaintiff's machine has a point where the axis of rotation of the reticle intersects the line extending through the center of the light source and the center of the lens (Tr. 1834). This point may be considered as the center of rotation of the reticle within the meaning of the language in Claims 9 and 24.

Actually, the term "center of rotation" was used in Claim 9 in an attempt to define a centered optical system. As the District Court admitted in paragraph (b) relating to Claim 9, the optical axis in the San Marino machine does lie within the periphery of the bottom of the bottle (R. 1949, 1950). Because of this, San Marino does come within the intent of the language in Claims 9 and 24.

(j) The District Court Erroneously found
that Plaintiff's Scanning Member does
not have Alternate Radial Opaque and
Translucent Areas

In erroneously finding Claim 24 to be non-infringed, the District Court ruled that plaintiff's scanning member "does not have alternate radial opaque and translucent areas" (R. 1953). The District Court predicated this holding in part on the basis



that reading "the patent as a whole, the term "areas" means more than one with respect to both opaque and translucent respectively". This has been discussed in detail in paragraph (a) above.

The District Court also held that the opaque area in plaintiff's machine does not extend "in a radial direction out from the center in the same or similar sense as the opaque areas of the scanning disc disclosed by the patent in suit" (R. 1953). This is again being hypertechnical. Although the opaque areas in the '640 patent start like a pie at the center of the reticle, the term "radial" is not intended to be limited to such a configuration. It was certainly intended to cover plaintiff's scanning line since plaintiff's scanning line bisects the scanning member and has boundaries only $1/64$ " on opposite sides of the center of the scanning member.



F. SUMMARY AND CONCLUSION

As hereinabove explained, the District Court arrived at erroneous conclusions concerning the issues of validity and infringement through an improper approach to these issues. The Court strove diligently to understand the particular embodiment of the invention disclosed in the patent-in-suit and regarded that embodiment as constituting the "invention". Laying aside initially the matter of the validity of the patent under § 103 of Title 35, the District Court then sought to understand the operation of plaintiff's machine and to compare such machine and its operation with the machine embodiment and its operation as disclosed in the patent-in-suit. Noting certain technical differences, such as the single-spoked reticle, the use of reflective, instead of refractive, optics, the use of RC instead of LC circuits, and certain differences in the electronic processing of the results of the spatial filtering accomplished by both plaintiff's and defendant's reticles, the District Court concluded that plaintiff's machines were not sufficiently identical to the machine embodiment of the patent, and hence, did not infringe the latter. In this approach, then, the District Court erroneously took a very restricted view of what the patent covered.

The District Court then turned to the issue of validity where, we submit, it committed further error in accepting plaintiff's assumption, unsupported by any evidence, that the



relevant prior art was far broader than patents and publications involving bottle inspections and included such patents as those in the missile and star tracking fields. Such assumption runs squarely contrary to the guidance offered by the John Deere case as to what properly constitutes prior art. The District Court also held improperly that the missile and star tracking patents were analogous art to that of bottle inspection even though a contrary finding should have been made on the basis of the testimony of plaintiff's witnesses and on the basis of the considerable differences between missile or star tracking and bottle inspection. Through the cumulation of these errors, the District Court found the machine of the patent obvious, and hence, invalid under §103 and did so as an afterthought, subsequent to reaching its conclusion that there was no infringement.

As we have attempted to point out in this brief, however, the District Court should first have ascertained the extent of the inventors' contribution to the relevant art, namely, that relating to the bottle inspection field. In so doing, the District Court would have found that the patent-in-suit was the first in that art to disclose a centered optical system which provided spatial filtering and then electronically processed signals, developed at the output of a photocell through such spatial filtering, to discriminate between signals produced by the presence of a foreign particle and unwanted and interfering

signals produced by other discontinuities in the bottle being inspected, such as interfering signals produced by the edge of the bottle. This, then, is the invention of the patent -- with the specific machine and circuit disclosure of the patent simply being "the best mode" known by the inventors at the time of filing their application for practicing said invention. Such invention was not obvious to persons skilled in the bottle inspection art, as the District Court admitted. Hence, the patent is valid under §103.

When this broader view of "the invention" of the patent is understood and adopted, it is then also quite simple to appreciate that the plaintiff's machines utilize fully the invention of the patent-in-suit, although they may employ the different mechanical and electronic expedients noted by the District Court. However, such mechanical and electronic expedients are equivalent to those disclosed in the patent for the reasons explained in this brief. Reading the claims as broadly as the scope of the invention justifies, this Court should readily find that plaintiff's machines are covered by one or more of these claims, and hence, infringe the patent-in-suit.

Rarely does a patentee prove the issues of validity and infringement through the admissions of the infringing party's witnesses. This is such a case. On essentially all

of the important points in this case, defendant has supported its position by citing testimony of plaintiff's witnesses, Husome, Stoate, Ryde and Greist, in cross-examination. These admissions should be afforded far greater credence than any testimony which such witnesses may have given on direct examination since such admissions represent the true positions of the witnesses rather than the positions adopted by plaintiff and mouthed by the witnesses.

Appellant submits, therefore, that the judgment of the District Court holding the patent-in-suit invalid and not infringed by appellee's machines should be reversed.

DATED: MAY 13, 1968.

Respectfully submitted,
SMYTH, ROSTON & PAVITT

By Ellsworth R. Roston
Attorneys for Appellant

C E R T I F I C A T E

I certify that, in connection with the preparation of this brief, I have examined Rules 18, 19 and 39 of the United States Court of Appeals for the Ninth Circuit, and that, in my opinion, the foregoing brief is in full compliance with those rules.

Ellsworth R. Roston

AFFIDAVIT OF SERVICE

The undersigned hereby certifies that three (3) copies of the within Brief were this 13th day of May, 1968, served upon Martin R. Horn, Esq. of Spensley, Horn and Jubas, Attorneys for Appellee, by enclosing the same in a postpaid wrapper addressed to said attorney at Suite 1400, 6380 Wilshire Boulevard, Los Angeles, California 90048, and depositing the same in the United States mail.

Ellsworth R. Roston

APPENDIX A

The District Court made the following findings of fact with respect to the prior art:

"11. The Court finds that each of the elements of the patent in suit as hereinabove discussed was well known in the prior art:

(a) A centered optical system, including a disc providing a radial scan, is disclosed in the British patent No. 517,229 issued to Stoate January 24, 1940, and United States patent No. 3,034,405 filed October 13, 1953, and issued to Biberman, et al., May 15, 1962.

(b) The use of DC to detect large objects in a container is disclosed by Stoate '229; United States patent No. 2,265,037 issued to Gulliksen December 2, 1941; United States patent No. 2,439,490 issued to Schell April 13, 1948.

(c) The use of AC to detect foreign objects is disclosed by United States patents to Fitz-Gerald No. 2,016,036; Biberman No. 3,034,405; Schell No. 2,439,490; and Weathers No. 2,427,319. The art of attenuating signal components having undesirable frequencies in an AC signal to emphasize other signal components having a particular frequency or frequencies in the AC signal is well known. The art of emphasizing the signal components having the particular frequency or frequencies in the AC signal is also well known.

(d) The Stoate '229 patent discloses a DC system, but does not disclose or contemplate the concept of spatial filtering for the generation of signal components of different frequencies and the selection by electronic techniques of the frequency or frequencies representing small particles in the bottom of the bottle.

(e) The Biberman '405 patent discloses a missile or star tracking system but does not disclose a bottle inspection system. The Biberman '405 patent is the only reference specified in paragraphs 11(a), 11(b) and 11(c) of the Findings of Fact that discloses a centered optical system with a radial scan for providing spatial filtering." (Finding No. 11 (a)-(e); R. 1942,1943).

"14. Of the above-mentioned prior art references, only Fitz-Gerald '036 was before the United States Patent Examiner. However, the Patent Office cited references disclosing centered optical systems with radial scans in the field of star tracking and missile tracking systems, and the defendant, through its attorneys, called other similar references to the attention of the Patent Office. Such references further disclosed the concept of spatial filtering in the star tracking and missile tracking field. The '640 patent was granted over such references. (Finding No. 14; R.1944).



"15. Upon review of the evidence adduced, the Court finds that the following patents are part of the relevant prior art:

(a) Stoate '229 teaches the use of a centered optical system with a rotatable scanning member having a single radial slit. The scanning member is disposed above the bottle being inspected, with its axis of rotation coincident with the common axis of a light source, bottle and a photocell. * * *

(b) Biberman '405 discloses, in a star tracking or missile tracking system, a centered optical system including a reticle with alternately disposed opaque and translucent areas for the detection of a foreign object in a field of view. Biberman '405 further suggests the use of AC circuitry tuned to a particular frequency to detect a foreign object in a field.

(c) Schell '490 and Weathers '319 teach the combination of an AC signal for the detection of small foreign particles in a field of view, and a threshold or DC level signal for the detection of opaque bottles and large particles in bottles. Further, the Weathers patent discloses the detection of foreign particles in the field of view by use of a tuned circuit." (Findings Nos. 15(a), (b) and (c); R. 1944-1945).

"17. The detection of objects in a field of view in the star tracking or missile tracking field occurs in a

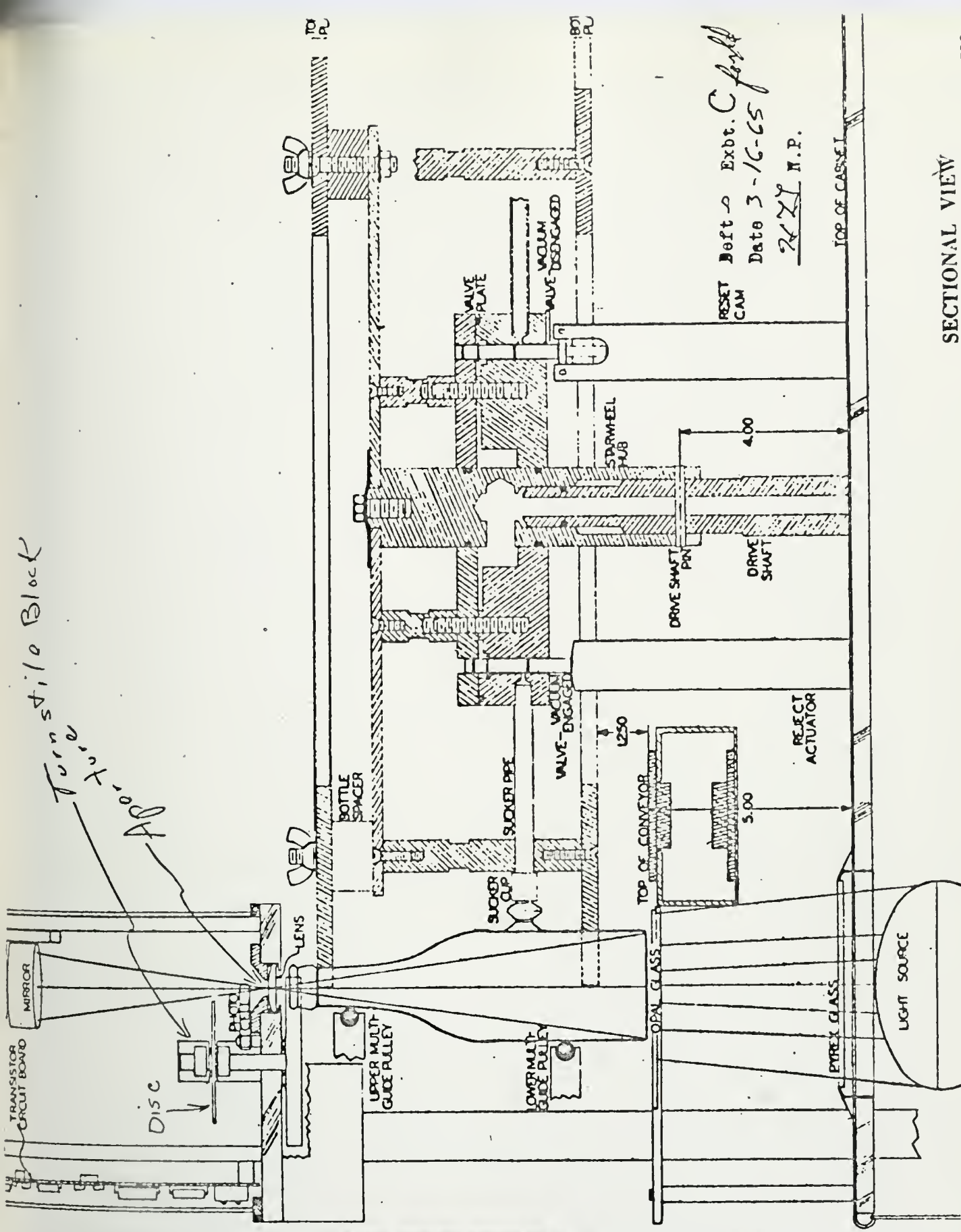
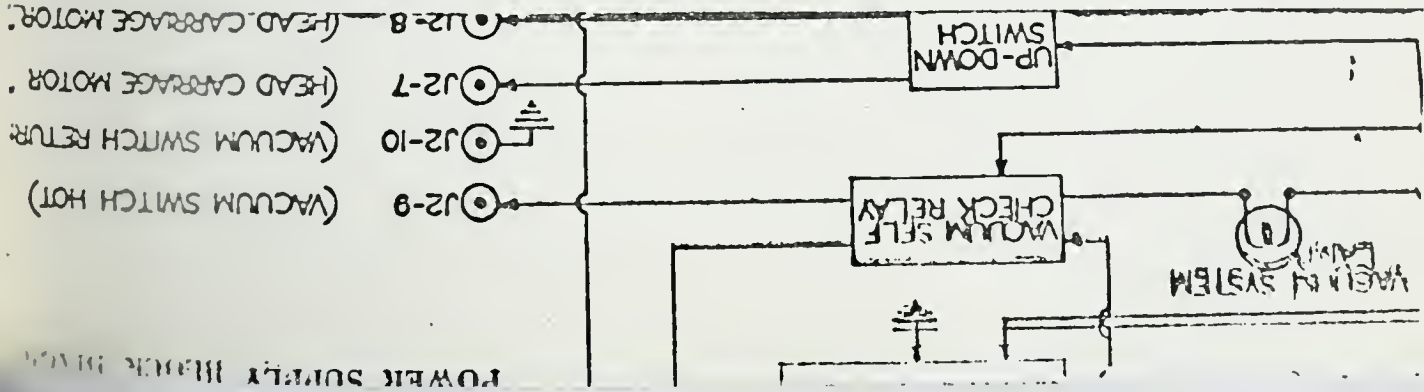
relatively homogeneous background. The detection of a small foreign particle in the bottom of a bottle occurs in a substantially non-homogeneous background, especially since the signal components produced by scanning the edges of the bottle have a much greater intensity than the signal components produced by scanning small particles in the bottom of the bottles. Nonetheless, the Court finds that both come within the art here concerned as defined in paragraph 9 hereof. (Finding No. 17; R. 1945, 1946).

"18. Some of the problems presumably encountered and solved in the development of the defendant's alleged invention were previously recognized and solved by others in the field of missile or star tracking prior to the filing of the '640 patent application by the inventors. Other such problems were previously recognized and solved in the field of bottle inspection prior to the filing of the patent application by the inventors. Some of the problems specific to the bottle inspection field, including the effects of the edge of the bottle, were neither recognized nor solved by others prior to the filing by the inventors of the patent application which matured into the '640 patent. (Finding No. 18; R. 1946).

"19. The Court finds that both Williams and Calhoun, the named co-inventors of the patent in suit, possessed at



least ordinary skill in the guided missile and missile tracking field, wherein the use of spoked reticle-AC systems for the electro-optical detection of objects against a background was well known prior to filing the patent application for the patent in suit. * * * " (Finding No. 19; R. 1946, 1947).



SECTIONAL VIEW
STANDARDIZED AND INSPECTION SYSTEM

APPENDIX C

The District Court made the following conclusions of law:

"4. 35 U.S.C.A. Section 282 provides in part, 'A patent shall be presumed valid. The burden of establishing invalidity of a patent shall rest on a party asserting it'. Plaintiff herein is charged with that burden.

"5. Whether arts are analogous depends upon the similarity of their elements and purpose. If elements and purpose in one art are so related and similar to those in another art that the relationship would appeal to the mind of a person having mechanical skill and knowledge of the purposes of the other, then the arts may be said to be analogous. The nature of the art or field of interest we are here concerned with is the detection of objects in a field of view by electro-optical techniques, rather than being limited to the bottle inspection field. (See also Finding No. 9.)

"6. Electro-optical systems for the detection of objects in the sky, detection of material moving on a conveyor, detection of the presence of objects moving on the ground, and detection of objects in a container, all are systems which reside in an analogous art, and such systems employ similar elements in a similar relationship for a

similar purpose. Further, such systems are related by the end object of seeking to detect an object having distinct light or dark characteristics in a background of different light or dark characteristics. (See also Finding No. 10.)

"7. Both parties have properly characterized the patent in suit as a combination patent. In construing the patent, it must be read as a whole and the claims interpreted in the light of the specifications.

"8. The evidence establishes and the Court concludes that each element of the patent in suit is anticipated in prior art references as such prior art is defined in Conclusions 5 and 6 hereof. No single element of the patent in suit constitutes invention. Scrutiny of combination claims should be even more detailed when, as with the patent in suit, the old elements have been previously employed in a similar relationship for a similar purpose, or when the elements perform the same function in combination as out of it.

"9. Even if all the claims here in issue disclosed the combination of all of the elements of the alleged invention, each of such claims would be invalid for lack of invention over the prior art here concerned. 'A patent for a combination which only unites old elements with no change in their respective functions, . . . obviously withdraws what

already is known into the field of its monopoly and diminishes the resources available to skillful men.'

Farr Co. v. American Air Filter Co., 318 F.2d 500,
503 (9th Cir. 1963).

"10. The validity of the '640 patent depends on the disclosure of a combination that 'produces in some way or manner a surprising or unusual result which would not have been expected by a person having ordinary skill in the art.'

Canadian Ingersoll-Rand Company v. Peterson
Products of San Mateo, 223 F. Supp. 803, 808
(N.D. Calif. 1963).

The patent in suit does not meet this test. The results of combining elements as was done in the '640 patent would be obvious to one of ordinary skills in the art of detecting objects in a field of view by electro-optical techniques.

"11. No claims in the patent are so broad as to purport to include each of the elements of the combination that the defendant contends for its patent, as set forth in Finding of Fact No. 4.

"12. All of claims 7 to 15, inclusive, and 17 to 24, inclusive, are invalid as being obvious under 35 U.S.C.A. Section 103.

"13. If the missile and star tracking field cannot be properly considered with the bottle inspection field as a single art of detecting objects in a field of view by electro-optical techniques, the system disclosed and claimed in the '640 patent constitutes an invention over the prior art relating to bottle inspection, and the patent is valid. (R.1954-1956). * * * *

"18. The burden of proof is upon the one asserting infringement to establish the infringement of a patent by a preponderance of the evidence.

"19. Where the elements of the patent are found in various prior patents in the same art or field of interest, the patent will be construed strictly according to its terms. The terms in a patent must be strictly construed against the patentee in determining infringement. Claims must be construed not only in the light of the specification and drawings, but also with reference to the file history; claims must always be explained by and read in conjunction with, the specification and in the light of definitions and admissions made by the applicant in Patent Office proceedings.

"20. In order for a patent to be infringed, each and every element of at least one of the claims of the patent must find its counterpart in the accused device, a situation that is not present here as to any claim.

"21. In order to constitute equivalency of devices, it must be established that the same or similar functions are performed in substantially the same way or manner or by the same, or substantially the same, principle or mode of operation. Although the device disclosed in the '640 patent and the SME devices are similar from the standpoint of result (or function) (save the neck detection function of the SME machines, a capability not achieved by defendant's device), they are dissimilar as to the means of achieving these results (or performing these functions), and therefore are not equivalent.

"22. An invalid patent may not be infringed, and the Court accordingly concludes that none of the claims here concerned are infringed by the plaintiff's machines. Moreover, even if the patent in suit were in any respect to be declared valid, the Court concludes that it is not infringed, in light of Conclusion No. 20 hereof and Finding of Fact No. 22.

"23. Plaintiff is entitled to a declaratory judgment on its Complaint that claims 7 to 15, inclusive, and 17 to 24, inclusive, of the patent in suit are invalid and not infringed." (Findings Nos. 4-13, 18-22; R. 1957-1958).

APPENDIX D

A. DESCRIPTION OF INVENTION IN EACH OF THE PATENTS CITED BY THE DISTRICT COURT

Fitzgerald Patent 2,016,036

Fitzgerald discloses a photoelectric system using a first screen divided into transparent and opaque squares 7 and 70 and a second screen divided into transparent and opaque squares 70 and 7 to detect movements of an object 3. Light is directed by a lens 1 and prisms 4,40 and 5,50 to form two parallel beams. The first and second screens are so disposed relative to the beam that light is passed through the transparent squares of only one of the screens at any one time to the moving object 3. This will cause the image of the object to appear alternately at opaque and transparent segments of the screens to produce signals alternately at photocells 6 and 60. Electrical circuitry is provided to detect the alternating signals produced at the photocells 6 and 60.

Biberman Patent 3,034,405

Biberman discloses a scanner for use with a target signal generator 10 to detect a target in a sky. The generator 10 includes a rotor 22 and a scanner 30 mounted on the rotor to provide spatial filtering. Two different patterns for the scanner are illustrated in Figures 3 and 4. A Cassegrain telescope focuses onto the scanner 30 radiation from sources

within the view of the telescope. The Cassegrain telescope has a spherical reflector 12 with an opening 13 in the center and a plane reflector 16. The reflectors 14 and 16 are mounted on a gimbal 18.

British Patent 517,229

By combining British patent 517,229 and British patent 469,458 and by particularly construing such portions of British patent 517,229 as page 3, lines 41 to 46, inclusive, and page 3, lines 76 to 85, inclusive, a scanning system with a centered optical scan may be construed. A bottle may be disposed with a slit 12 having a substantially radial configuration and may be rotated relative to the slit. Light is directed upwardly through the slit and the bottle from a source to a photocell. When a particle interrupts the light, the average amount (dc) of light reaching the photocell decreases to provide an indication of the particle.

Gulliksen Patent 2,265,037

Gulliksen discloses a system in which a lens 14 is rotated and simultaneously driven in a radial direction to define a spiral movement. The lens 14 is disposed between a light source and a bottle so as to scan the entire bottom of the bottle as it describes the spiral path. A phototube 18 is disposed above the bottle to receive the light passing through the bottle. When a particle in the bottom of the bottle

interrupts the light passing through the bottle, an impulse is generated at the photocell 18 to indicate the presence of the particle. This impulse is amplified at 19.

Weathers Patent 2,427,319

This patent relates to a system for inspecting full bottles for particles. The bottles are carried by a turntable past an inspection point at which light is directed through the bottle onto the photocell 72 by an optical system 73. The turntable is driven by an appropriate gear 74. As the turntable rotates, pulleys 75 connected to the successive bottles are brought in contact with a belt 76 driven by a motor 80. This causes the bottles to spin and the bottles thereafter continue to spin freely for a moment until the pulley 75 strikes a brake shoe 86. The pulley is thus brought to a stop and the bottle is also stopped. However, the liquid contents within the bottle continue to swirl at a particular speed.

The optical system includes two banks of phototubes 12 and 14. Light from the inspecting beam 10 passes through the fluid contents of a bottle under inspection and is distributed between the two banks equally. In the absence of any particle, the output of one bank of photocells is balanced against the equal output of the other bank. When a particle is present in the liquid, an unbalance is produced between the banks of photocells as the particle crosses the beam of light. This unbalance causes a signal to be produced at a frequency



dependent upon the size of the particle. Waveforms produced by particles of different size are illustrated in Figure 1.

Schell Patent 2,439,490

Schell discloses a system in which the bottle to be tested is initially rotated and then stopped in a manner similar to the Weathers patent. When the bottle is stopped, any particles in the bottle continue to rotate so as to produce pulses at the photocells 6 and 8. These pulses are detected by an amplifier including the tubes 46 and 18 during an inspection period S1 in Figure 4, the switch 42 being closed and the switch 40 being open. The pulses cause the gas tube 18 to be fired and current to flow through relay coil 48 to obtain a rejection of the bottle.

Schell also detects the opacity of the bottle during a time period S2, which occurs by closing the switch 40 and opening the switch 42. When the switch 42 is opened, it introduces the resistor 44 into a circuit with the photocell 8 so as to increase the potential at point A. This increase in potential is dependent upon the resistance of the photocell 8, this resistance in turn being dependent upon the opacity of the bottle being inspected. When the bottle being inspected is relatively opaque, a single pulse passes through a tuned circuit (Tr. 2318) and causes current to flow through the relay coil 48 to obtain a rejection of the bottle.



B. THE REFERENCES CITED BY THE DISTRICT COURT DO NOT DISCLOSE OR ANTICIPATE THE COMBINATION OF FEATURES CONSTITUTING THE INVENTION OF THE '640 PATENT

The '640 patent may be considered to provide a centered optical system (with a radial scan) to provide spatial filtering for producing signal components at different frequencies to represent particles in the bottom of the bottle and undesirable effects such as edge effects in combination with electronic circuits to select the signal components at the frequencies representing the particles in the bottom of the bottle. The combination of features may also be considered to include electronic circuits for separately processing the steady state (or dc) signal components to indicate the opacity of the bottle and the presence of large particles in the bottle.

None of the references cited by the District Court discloses the combination of features discussed above.

Biberman Patent 3,034,405 may be considered to disclose a centered optical system (with a radial scan) to provide spatial filtering and may be considered to suggest electronic circuits to provide frequency selection. However, the Biberman patent relates to the missile tracking field, which is not analogous to the bottle inspection field.

Stoate Patent 517,229 may be considered to disclose a centered optical system for inspecting empty bottles for

foreign particles. However, Stoate did not appreciate the significance of spatial filtering to provide a frequency spectrum where the frequencies of the signal components representing the particles are separated from the frequencies of the signal components representing undesirable effects such as edge effects in the bottle. Because of this, Stoate also does not provide electronic filtering to select the signal components having frequencies representing the particles in the bottom of the bottle.

Gulliksen Patent 2,265,037 does not provide a bottle inspection system with centered optics and further does not provide spatial filtering or electronic filtering. The provision of a spiral scan by Gulliksen required him to mask the edge of the bottle so that particles near the edge of the bottle could not be detected.

Fitzgerald Patent 2,016,036 does not disclose a centered optical system and further does not disclose a system for detecting empty bottles for particles. Fitzgerald also does not disclose an inspection system which employs the techniques of spatial filtering and electronic filtering to isolate the signal components representing particles at the bottom of the bottles from the signal components representing undesirable effects such as edge effects at the bottom of the bottle.

Weathers Patent 2,427,319 does not disclose an inspection system for empty bottles and further does not disclose a centered optical system. Weathers also does not disclose the concept of spatial filtering to provide individual frequencies for the signal components representing particles in the bottom of the bottle and undesirable effects such as edge effects in the bottles.

Schell Patent 2,439,490 discloses a system for detecting particles in full bottles and for detecting the opacity of the bottles. Since the Schell patent constitutes an improvement of the Weathers patent, Schell does not disclose a centered optical system and further does not disclose spatial filtering. Schell also does not disclose a system for producing a direct current signal to indicate the opacity of the bottle being inspected and to indicate large particles and alternating current signals or pulses to indicate small particles and for separately processing the direct current and alternating current signals. In contrast, Schell produces first pulses to indicate large particles and alternating current signals and second pulses to indicate small particles and processes the first and second pulses in the same electrical circuits.

IN SUMMARY:

1. Only Stoate Patent 517,229 may be considered to disclose a centered optical system for use in bottle inspection.

2. None of the patents discloses spatial filtering in bottle inspection systems to separate the frequencies of the signal components representing the particles from the frequencies of undesirable effects such as the edge effects in the bottles.

3. None of the patents discloses the concept of providing alternating current signals or pulses to represent small particles in the bottom of the bottle and of providing direct current signals to represent large particles in the bottle and opaque bottles and of separately processing the alternating current signals and the direct current signals.

